



**OVERCOMING BARRIERS TO  
CLIMATE CHANGE ADAPTATION  
IMPLEMENTATION IN  
SOUTHERN AFRICA**

Edited by  
Lesley Masters and  
Lyndsey Duff

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# OVERCOMING BARRIERS TO CLIMATE CHANGE ADAPTATION IMPLEMENTATION IN SOUTHERN AFRICA

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Lyndsey Duff

## **Overcoming Barriers to Climate Change Adaptation Implementation in Southern Africa**

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# Foreword

A binding agreement that supports adaptation is among the key priorities for the African continent during the ongoing climate change negotiations under the auspices of the United Nations (UN). However, the political economy of the region being marked by different levels of development, high socio-economic inequalities, high levels of poverty, weak economies, low use of new technologies, over-reliance on fossil fuel for energy, relative political instability and degradation of the natural environment presents a number of challenges for the Southern African region. It is against this context that the Institute for Global Dialogue (IGD) set out to conduct a policy-orientated analysis of adaptation implementation challenges and ways of overcoming them for the benefit of policy makers and observers alike.

This is the result of coordinated research conducted in most of Southern Africa, the outcomes of which were debated, tested and refined in an open multi-stakeholder dialogue hosted by the IGD on 4 April 2011. The discussion debated the nature of the barriers to adaptation in areas as diverse as political governance, social development, economic governance, finance, technology and law in an appropriate regional and global contextual backdrop.

Through this volume we hope to contribute to better championing of a broadly developmental agenda, and one that enhances climate change adaptation during the climate change negotiations in Durban in order to make this a truly successful 'African Conference of Parties (COP)'. The project was conceptualised and conducted by the IGD, with Dr Lesley Masters as the project manager. It enjoyed the support of Dakar-based Trust Africa, an African grant-making agency under the stewardship of Dr Bhhekinkosi Moyo, and this book is a co-publication between the IGD and the Africa Institute of South Africa (AISA), a premier African affairs research centre.

**Siphamandla Zondi**  
August 2011

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# Abbreviations and acronyms

|         |                                                      |
|---------|------------------------------------------------------|
| 4AR     | IPCC 4th Assessment Report                           |
| AAP     | Africa Adaptation Programme                          |
| AAP NAM | Africa Adaptation Programme Namibia                  |
| ACCRA   | Africa Climate Change Resilience Alliance            |
| AfDB    | African Development Bank                             |
| AISA    | Africa Institute of South Africa                     |
| ARAs    | National Water Administrations                       |
| AU      | African Union                                        |
| AWG-LCA | Ad Hoc Working Group on Long-Term Cooperative Action |
| BAM     | Border adjustment (tax) measure                      |
| BCP     | Botswana Congress Party                              |
| BDP     | Botswana Democratic Party                            |
| BIT     | Bilateral investment treaty                          |
| BMD     | Botswana Movement for Democracy                      |
| BNF     | Botswana National Front                              |
| BPP     | Botswana People's Party                              |
| CAF     | Cancún Adaptation Framework                          |
| CBA     | Community-based adaptation                           |
| CBNRM   | Community-based natural resource management          |
| CDM     | Clean Development Mechanism                          |
| CIF     | Climate Investment Fund                              |

|                |                                                |
|----------------|------------------------------------------------|
| ClimDev-Africa | Climate for Development in Africa Fund         |
| COMESA         | Common Market for Eastern and Southern Africa  |
| COP            | Conference of the Parties                      |
| CTF            | Clean Technology Fund                          |
| DEA            | Department of Environmental Affairs (Botswana) |
| DNA            | National Directorate of Waters                 |
| EIA            | Environmental impact assessment                |
| FAO            | UN Food and Agriculture Organization           |
| FAP            | Financial Assistance Policy                    |
| FDI            | Foreign direct investment                      |
| GHG            | Greenhouse gas                                 |
| I & FF         | Investment and Financial Flows                 |
| IDP            | Integrated Development Plan                    |
| IGD            | Institute for Global Dialogue                  |
| INAM           | National Meteorology Institute of Mozambique   |
| IPCC           | Intergovernmental Panel on Climate Change      |
| IPR            | Intellectual property                          |
| LBMP           | Land-based marine pollution                    |
| LDC            | Least developed countries                      |
| LDCF           | Least Developed Countries Fund                 |
| LULUCF         | Land use, land use change and forestry         |
| MAP            | Municipal Action Plan                          |
| MCA            | Millennium Challenge Account                   |
| MDB            | Multilateral development bank                  |
| MDG            | Millennium Development Goal                    |
| MW             | Megawatt                                       |

|          |                                                                                                   |
|----------|---------------------------------------------------------------------------------------------------|
| NACSO    | Namibian Association of Community-Based Natural Resource Management (CBNRM) Support Organisations |
| NAD      | Namibian dollar                                                                                   |
| NAPA     | National adaptation programme of action                                                           |
| NCS      | National Conservation Strategy (Botswana)                                                         |
| NDPs     | National Development Plans                                                                        |
| NEMA     | National Environmental Management Act                                                             |
| NEM:ICMA | National Environmental Management: Integrated Coastal Management Act                              |
| NEPAD    | New Partnership for Africa's Development                                                          |
| NGO      | Non-governmental organisation                                                                     |
| NPC      | National Planning Commission                                                                      |
| ODA      | Official development assistance                                                                   |
| OECD     | Organization for Economic Cooperation and Development                                             |
| REDD+    | Reducing emissions from deforestation and forest degradation plus                                 |
| SACU     | Southern African Customs Union                                                                    |
| SADC     | Southern African Development Community                                                            |
| SAIIA    | South African Institute of International Affairs                                                  |
| SCCF     | Special Climate Change Fund                                                                       |
| SCF      | Strategic Climate Fund                                                                            |
| SIDS     | Small-island developing state                                                                     |
| SPS      | Sanitary and phytosanitary                                                                        |
| SRES     | Special Report on Emissions Scenarios                                                             |
| SSA      | Sub-Saharan Africa                                                                                |
| TRIPS    | Trade-Related Aspects of Intellectual Property Rights Agreement                                   |

|        |                                                       |
|--------|-------------------------------------------------------|
| UNDP   | United Nations Development Programme                  |
| UNEP   | United Nations Environment Programme                  |
| UNECA  | United Nations Economic Commission for Africa         |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VCF    | Veterinary Cordon Fence                               |
| VDC    | Village Development Community                         |
| WTO    | World Trade Organization                              |



# Introduction

*Lyndsey Duff*

Global climate change is possibly the greatest environmental challenge facing the world in the twenty-first century. Although often referred to as ‘global warming’, climate change encompasses serious disruptions to the world’s entire weather and climate patterns, including impacts on rainfall, extreme weather events and sea-level rise, as well as moderate to extreme global temperature increases. In July 2011, United Nations (UN) Secretary-General Ban Ki-moon declared that climate change is a direct threat to international peace and security, and that developed and developing countries alike need to shoulder their fair share of responsibility for the negative effects of the phenomenon.<sup>1</sup>

The developed world has sought to tackle climate change primarily through an emphasis on mitigation efforts, or action taken to reduce the effects of greenhouse gas emissions. The *Stern Review*, authored by economist Nicholas Stern, identifies several ways of mitigating climate change. These include reducing demand for emissions-intensive goods and services, increasing efficiency gains, increasing the use and development of low-carbon technologies, and reducing fossil fuel emissions.<sup>2</sup> However, the UN, as well as countries directly affected by climate change, are now turning their attention to adaptation efforts. Adaptation measures offer solutions that seek to reduce the vulnerability of both human and environmental systems to the effects of climate change. Such measures are necessary due to the strong probability that even if mitigation efforts succeed in halting global carbon emissions, the effects of climate change will last for decades. As a result, action will be required to prevent large-scale environmental catastrophes. The adaptation process consists of four key components: first, the assessment of climate impacts and vulnerability; second, planning for adaptation; third, the implementation of adaptation measures; and fourth, the monitoring and evaluation of adaptation actions.<sup>3</sup> Indeed, the Intergovernmental Panel on Climate Change (IPCC), established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Association, argues through its Working Group

II that mitigation and adaptation should be complementary processes to respond to climate change and global warming.<sup>4</sup>

The United Nations Framework Convention on Climate Change (UNFCCC) is tackling the issue of adaptation through a myriad of forums and frameworks for action. One such engagement is the Nairobi Work Programme, which aims to assist all countries in improving their understanding and assessment of the impacts of climate change and to make informed decisions on practical adaptation actions and measures. National adaptation programmes of action also exist to prioritise urgent and immediate adaptation needs for least developed countries. A local database has been created to facilitate the transfer of long-standing coping strategies and knowledge from communities that have adapted to specific hazards or climatic conditions to communities just beginning to experience such conditions as a result of climate change. In addition, UNFCCC parties adopted the Cancún Adaptation Framework (CAF) as part of the Cancún agreements at the 2010 Climate Change Conference in Cancún, Mexico (COP16/CMP 6). In these agreements, party states affirmed that adaptation must be addressed with the same level of priority as mitigation. The CAF is the result of three years of negotiations on adaptation under the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) under the Convention, which had followed the adoption of the Bali Action Plan at the 2007 Climate Change Conference in Bali, Indonesia (COP13/CMP 3). The Bali Action Plan sought to enable the full, effective and sustained implementation of the Convention through long-term cooperative action in the present, as well as up to and beyond 2012.<sup>5</sup>

The developing world faces far greater challenges than the developed world, both in terms of the impacts of climate change and the capacity to respond to it. Populations and communities vary greatly in terms of their capacity to adapt and respond to the phenomenon; and developing countries, particularly the least developed countries, are generally poorest in this regard. As a result, they have a reduced capacity to adapt and are more vulnerable to climate change consequences, just as they are more vulnerable to other stresses. This condition is the most extreme among the poorest people.<sup>6</sup> As such, adaptation remains the highest priority to Africa in enabling communities to adjust and adapt to their changing environment. The Africa Group at the Copenhagen and Cancún climate change negotiations in 2009 and 2010, respectively laid heavy emphasis on new, additional, predictable, accessible and significantly scaled-up funding for implementation, technology transfer and development, and support for capacity building.

The challenge is that unlike the global public-good character of climate change mitigation, adaptation is a unique and costly policy challenge specific to each individual nation state. Adaptation challenges are particularly severe in Southern Africa, where governments lack the fiscal resources, capacity and technology to adapt resiliently and adjust to climate change externalities, while simultaneously addressing a range of other socio-economic discontents (e.g. poverty, unemployment and inequality). It is, therefore, most disturbing that the Southern African region has contributed little to global warming,<sup>7</sup> but like the rest of the African continent, the sub-region will bear the brunt of the cost of climate change. Climate variability and change are already revealing a considerable impact in the region and are expected to intensify over the coming decades. Wider development pressures will exacerbate climate threats, which will undoubtedly compound already complex socio-ecological relationships. As a result, adaptation throughout the Southern African Development Community (SADC) is not an option, but a necessity. In order to facilitate successful adaptation at various levels, African governments need to be conscious of various obstacles that could impede progress. In the SADC region, financial, informational and natural limits to adaptation act as significant barriers to the implementation of sustainable adaptation policies.

Like most other developing countries in the world economy, Southern African nations are finding it increasingly difficult to implement adaptation activities as a result of a number of barriers. Indeed, the IPCC's Fourth Assessment Report (4AR) highlights that there are 'barriers, limits and costs which are not fully understood'. However, while the 4AR provides several adaptation strategies for dealing with the impacts of climate change, there has not been any significant attention given to identifying and addressing the barriers facing the implementation of these strategies. Where research has been undertaken, it has tended to be sector-specific, rather than bringing together the challenges facing the implementation of adaptation measures. Against this background, and in the light of the challenges identified above, the prospects and viability of climate change adaptation implementation in Southern Africa deserve urgent interrogation, intensive debate, and discussion. It was in this context that the Institute for Global Dialogue (IGD), with the support of Trust Africa, launched a comprehensive examination of the issue of adaptation in Southern Africa.

The project had several phases, beginning with the commissioning of research papers after the critical step of carefully and systematically

identifying academic, policy and technically oriented participants. The authors presented their draft papers at a regional workshop, held on 4 April 2011 at the Manhattan Hotel, Pretoria, in 20-minute individual sessions which were grouped into larger sessions, according to the theme of their research. Discussion among all conference participants was encouraged after each session, and the authors had the opportunity to engage with key stakeholders from civil society, NGOs, academia and government representatives.

In an effort to explore and identify the full spectrum of barriers to adaptation, the research and analysis was divided into five sections – political, economic, financial, technological and social barriers to adaptation. Drawing on expertise from across the Southern Africa region, ten papers were prepared for each of the five identified barriers: one that provides an overview and analysis of the specific challenges to adaptation and the second that highlights a particular case study from Southern Africa and the lessons learnt. As the research took shape, a clear gap in the analysis was identified in terms of the legal challenges facing adaptation implementation within the region. As the future climate change regime takes shape the legal aspect will play an increasingly important role in determining the implementation of internationally negotiated agreements. In order to address this knowledge shortfall, a final paper considering the legal barriers to adaptation implementation was commissioned.

In the first chapter Romy Chevallier tackles the political barriers to adaptation, focusing on the role that policy makers will play in the implementation of adaptation measures. The successful implementation of these efforts by Southern African states requires strong political will and commitment from the governments involved. This includes encouraging stakeholder buy-in and mainstreaming policies that support adaptation measures. In other words, for adaptation measures to be successful, there needs to be government leadership in coordinating activities. Political barriers therefore include, among others, a shortfall in government funding for the local development of research and planning; political opposition; shortfall in interdepartmental coordination and collaboration; the challenge of competing priorities (e.g. the minerals-energy complex); lack of adaptation mandates; and legal constraints. In addition, providing good governance to facilitate adaptation is hampered by governance challenges more broadly within the Southern African region. Elisha Toteng contextualises these challenges in the case study of Botswana, arguing that the influence of the dominant political party has proven the greatest factor

in the country's barriers to climate change adaptation. Toteng identifies the linkage between the discussion on adaptation and the developmental state in a country (and region) where development imperatives cannot be separated from the debate on climate change.

In addressing the implementation of adaptation, elements such as class, gender and culture can influence the successful implementation of adaptation measures. For instance, issues regarding women's role in society, labour migration, and even ethnic identity can play a major role. In setting the context for the social barriers facing adaptation implementation, Lindsey Jones explores the influence and implications of social barriers to adaptation, and how mindsets and perceptions constitute an important part of achieving efficient and effective adaptation to climate change. His chapter highlights the roles of social institutions in influencing how individuals choose and are allowed to respond to climate shock and stress within Southern African communities, and examines how restrictive social environments can prevent successful adaptation. Failure to work in partnership with communities, failure to take account of local knowledge, and dumping inappropriate and poor-quality technology will negatively impact on the success of adaptation implementation in the community. The introduction of adaptation methods needs to be appropriate to the circumstances and carried out in partnership with the people within the community in order to avoid problems associated with maladaptation. This is of particular importance, as adaptation activities may produce benefits such as socio-economic development and poverty alleviation. Accordingly, in their case study, Hayley Leck, Catherine Sutherland, Dianne Scott and Gregg Oelofse emphasise the centrality of social and cultural factors in influencing the implementation of adaptation measures. They explore the prospects of creating 'climate change citizenship', arguing that such citizenship bridges the actions required for both mitigation of, and adaptation to, climate change due to the espoused rights and concomitant responsibilities inherent in the term 'citizenship'.

Southern African countries confront a wide range of economic and other trade-related barriers to climate change adaptation. Sheila Kiratu examines the economic impacts of climate change, and how they have a bearing on the development of African economies and whether they thrive, or decline and fail. She seeks to identify government policies or measures of adaptation, as opposed to autonomous adaptation,<sup>8</sup> as the potential to adapt will be rooted in sound public policy – global and national. This, in turn, may decrease or increase the vulnerability of Southern African economies in the face of climate change. The liberalisation of trade in environmental goods and

services under the World Trade Organization (WTO) has the potential to lead to greater innovation and deployment of climate-friendly technology. However, there are valid concerns about entrenching the status quo of the South's dependence on the North for technology transfer (including current account imbalances), as well as dual-use technology that profits from tariff cuts. 'Green protectionism' is increasingly a concern, particularly among developing countries. Border adjustment measures (BAMs) aimed at offsetting 'carbon leakage'<sup>9</sup> could take various forms, such as carbon tariffs or charges, an obligation to purchase emission allowances upon importation, quotas, or onerous technical standards and regulations. BAMs could thus place a high burden of adjustment on African countries. Carbon-labelling schemes and standards will also present major non-tariff barriers to Southern African exports destined for the North, leading to a decline in trade and foreign direct investment (FDI) in the region. The role of bilateral investment treaties (BITs) in facilitating adaptation also appears ambiguous. On the one hand, BITs can promote predictability and hence investment in climate-friendly technologies; on the other hand, BITs can restrict Southern African governments' freedom to impose pro-climate requirements on international investors. With this in mind, Laudika Kandjinga, Jessica Smith and Juliane Zeidler scrutinise the economic and trade barriers to climate change adaptation in Namibia, including the regulatory environment, the lack of climate-proofed investment and tariff escalation, among other things.

Central to the challenges facing the implementation of adaptation in Southern Africa are questions concerning where new, predictable and additional funding will come from, its form, and how it will be accessed. The problem is that funding for adaptation is limited, the total cost of adaptation is difficult to estimate and the source and type of financing required for adaptation will be different for different sectors (i.e. agriculture, water, human health and infrastructure). Several funding mechanisms have been established to help developing countries address issues of adaptation. These include the Adaptation Fund, the Clean Development Mechanism (largely absent from Africa, given its FDI-proclivities), and the more recent Green Fund, which was developed as part of the 2009 Copenhagen Accord and Cancún agreements. However, these initiatives remain poorly financed. It is in this context that Bongani Motsa's chapter considers the challenge of procuring financial resources for climate change adaptation measures. As a case study, Michelle Pressend presents the issue of financing water adaptation in South Africa. Her chapter argues that current and proposed actions to adaptation in South Africa are mostly limited technical solutions or 'fixes'.

The funding, development and transfer of appropriate technology (including capacity-building and training activities) are further challenges that Southern African countries confront in adapting to the externalities of climate change. There is an ambiguous line between mitigation and adaptation technologies. The latter include carbon capture and storage and energy co-generation technologies, research and development (e.g. drought- and pest-resistant crops, genetically modified (GM) foods and modern medicines), innovative farming methods, land use, buffers and urban/rural zoning and planning. However, there are a number of barriers to technology transfer. A lack of knowledge or training may lead to a lack of awareness of the best available technologies. Moreover, a country with poor technological capacities may not be positioned to take advantage of the transfer of the most complex technologies. Inappropriate or old technology may even be ‘dumped’ in Southern Africa, with little training or support to apply these technologies, while entrenching the North’s ‘first-mover advantage’ in developing and commercialising costly climate-friendly technology. Intellectual property rights (codified in the World Trade Organisation’s [WTO’s] Trade Related Intellectual Property Rights [TRIPS] Agreement) may also act as a hindrance to the transfer of technology. In this light, Thokozani Simelane, Martin Kaggwa and Shingirirai Mutanga examine the technological barriers to climate change adaptation, employing a systems dynamic technique to draw their deductions. In their case study chapter, Boaventura Cuamba, Alberto Tsamba, Manuel Chenene, Alberto Mavume and Antonio Queface investigate technological barriers to adaptation in Mozambique, paying particular attention to Mozambique’s history of natural disasters, and effective strategies for adapting to climate impacts in the country.

Legal institutions and frameworks prove to be a further challenge to climate change adaptation. In the context of the legal barriers to adaptation implementation, the role of by-laws in complementing existing projects and to guide local community activity in the most constructive way of pursuing an initiative is noted in Marie Parramon’s chapter. She examines how different legal tools and templates could be used for a framework for local-government policies. Indeed, the implementation of effective adaptation measures to climate change is directly dependent on the provisions of the applicable relevant international and national legal frameworks.

Following the discussions that give attention to specific barriers to the implementation of adaptation measures, the conclusion combines



the analysis of the various studies in identifying key areas for potential cooperation and coordination. This chapter provides an important platform for policy considerations in addressing the challenges facing the implementation of adaptation measures within Southern Africa. It is our hope that the chapters contained in this publication will make a valuable contribution to the current international debates on climate change adaptation measures, and will inform further debate in drafting strategies for dealing with the potentially devastating effects of climate change in Southern Africa.

## Notes and References

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- 6 UNEP, 2001.
- 7 In Southern Africa – and Africa as a whole – South Africa's levels of carbon dioxide emissions stand out as an exception, ranking 12th highest per capita in the world.
- 8 Aaheim, A. and Aasen, M. describe autonomous adaptation as changes that economic agents make when confronted with climate change, for example shifts in the input needed to produce the same output. See also, *The economics of climate change mitigation*.
- 9 Various developed countries, particularly the US and the EU, have voiced concerns that lax commitments of major developing countries, notably China and India, will give these countries a 'competitive advantage' in the world economy and would have a negative impact on the environment, since reallocation of production to emission havens and changes in market shares would lead to increases in overall global emissions (i.e. 'carbon leakage').



# Political barriers to climate change adaptation implementation in SADC

*Romy Chevallier*

## Introduction

After defining adaptation and adaptive capacity, this chapter aims to address the following pertinent issues and questions:

- The vulnerability of Sub-Saharan African (SSA) countries and their urgent need for preparedness and proactive adaptation strategies.
- The apparent lack of political will and leadership from national governments in Africa (often tied to voting cycles and mandated terms).
- Difficulties of planning for climate impacts and the inconsistency between policy horizons and planning horizons.
- The need to improve climate science and vulnerability (impact) assessments – learning from the past and planning for future hazards.
- The need to consider whether existing climate change policies, plans and strategies in member countries are indeed appropriate in relation to the current status of knowledge about vulnerabilities at a national level.
- The inclusion of a multitude of stakeholders and the importance of a people-centred approach.
- Capacity building to enhance adaptation resilience.
- Mainstreaming climate change adaptation into broader economic and development policies.

Adaptation to climate change refers to the measures or actions aimed at managing the impacts of climate change and minimising its negative effects. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as ‘initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects’.<sup>1</sup> These adaptation initiatives and measures can take various forms; they can be anticipatory or reactive, private or public, autonomous or planned. Adaptive capacity, in turn, is defined as all of the ‘... capabilities, resources and institutions of a country or region to implement effective adaptation measures’.<sup>2</sup> This chapter seeks to identify and address the political barriers, limits and costs to effective implementation of adaptation policies, and highlight the barriers to enhancing adaptive capacity. In this context, barriers, both internal and external, refer to the inability of a state to deliver or implement effective climate change adaptation policies in a timely manner and without interference. Although some of the barriers cannot be described as solely political (as there is some overlap with the economic, social and technological barriers), this chapter will specifically address the political structures, institutions and actors involved in the creation and implementation of adaptation policy and processes. It will also address some of the governance challenges experienced within lead climate institutions and agencies.

It must be noted from the outset that the role of capacity development is to expand the coping range and strengthen the capacity of a system to adapt to climate change, including variability. Capacity enhancement can be addressed at various levels and involves several stakeholders, institutions and strategies. Therefore, adaptive capacity development is viewed as a central goal of most adaptation strategies and needs to be prioritised in policy development on climate change. An improved understanding of the capacity and policy barriers to implementation, as well as the political and cultural realities of an individual system, will help highlight the magnitude and urgency of the problem and enable African leaders to better articulate these priority areas in their political party manifestos, which in turn may lead to increased political commitment to address climate change adaptation.

## **The Urgent Need for Implementation of Adaptation Measures in Africa**

*The Stern Review* (2006), the *Fourth assessment report of the Intergovernmental Panel on Climate Change* (2007) and the UN’s *Human*

*development report* (2007) all concluded that SSA is the most vulnerable region to adverse impacts of climate variability and change. Food production in Southern Africa, for example, is closely tied to the amount and timing of rainfall and availability of water for irrigation. The region is highly vulnerable to changes in rainfall patterns and highly dependent on natural resources. The IPCC has stated that although some adaptation activities are taking place, they may be insufficient to prevent the current and future impacts of climate change.<sup>3</sup> These vulnerabilities and expected impacts should guide future policy decisions and inform key stakeholder decisions.

Adaptation challenges are particularly acute in Africa for numerous reasons that will be explored in this chapter. As correctly stated by the IPCC, ‘non-climate stresses can increase vulnerability to climate change by reducing resilience, and can also reduce adaptive capacity because of resource deployment to competing needs.’<sup>4</sup> The governments of the nine Southern African Development Community (SADC) countries tend to lack the adequate human and institutional capacity to deal with climate uncertainty, the fiscal reserves and technology necessary to enhance resilience and adjust to climate change impacts, the guidance and political will, and have an aversion to change. This pressing challenge is aggravated by the large variety of development challenges experienced in Southern Africa and the interplay and competition for attention and resources. These challenges are further perpetuated by the uncertainties of translating climate science into adaptation policy and other governance-related challenges, such as exclusive, non-people-centred approaches and insufficient awareness raising and educational tools. The practical implementation of climate change adaptation requires a deeper understanding of these barriers that impede adaptation both by African governments and the donor community.<sup>5</sup>

African countries (and the general electorate) have so far not recognised adaptation as a priority, mainly because they are preoccupied with more immediate economic challenges and pressing development needs. In order to elevate the importance of climate change adaptation, a mind-set shift is needed. Even though there are clear questions surrounding climate equity in the debate on adaptation (given that Africa is the most vulnerable to the impacts of climate change and yet has contributed the smallest amount to the build-up of greenhouse gases [GHGs]), the regional consequences of climate change for SSA are already observable and exacerbate the trends of desertification and biodiversity loss. These trends are diluting vital ecosystem services and thereby are detrimental to sustainable human development.<sup>6</sup>

The multiple stresses in SSA and its low adaptive capacity create a direct interface between climate change and development. It is, therefore, imperative that an attempt be made to understand climate change in the context of socio-economic development. Efforts to mitigate and adapt to climate variability must therefore seek to complement Africa's broader economic agenda and must not detract in any way from its existing development objectives. Co-benefit models (so-called 'no-regrets' approaches) and infrastructure projects that simultaneously address environmental sustainability and socio-economic development are good models for the region, and project developers and policy makers should seek to replicate them.

Adaptation to climate change includes all actions that reduce potential vulnerability and damage – these may be actions in a narrow engineering sense, or policy decisions and planning that influence the adoption of particular strategies. These actions might include strengthening and climate-proofing bridges to withstand stronger storms and floods; planting a wider range of crops to reduce vulnerability to changes in rainfall; or finding ways to benefit from opportunities associated with climate change. Therefore, adaptation involves a wide range of actors – from individual farmers to national planning agencies – representing a wide range of sectoral interests who must be involved in decision making at many levels. For these actors, climate change adaptation is not necessarily their primary concern. This might be because the impacts of climate change are not always immediately obvious, policy or market failures do not encourage medium- to long-term planning, responsibilities for action are unclear and unquantifiable or because adaptation is concerned with collective goods, but has local impacts and requires a local focus.

Economic considerations also deter African governments from active participation in adaptation scenarios. The Southern African region is heavily dependent on fossil fuels for its electricity. The region, therefore, needs to find ways to switch to a low-carbon growth trajectory and plan for a climate-constrained future. Although Southern Africa in the past few years has witnessed an increase in cleaner, more energy-efficient coal-fired generation plants and the termination of older technologies, much more needs to be done to promote rapid diffusion of technology in the developing world, and to make existing renewable energy more economically feasible. In other countries in SSA (particularly those in central Africa) deforestation and land-use change are the main contributors to GHG emissions. For these countries, wood and charcoal are the main energy sources, with little alternative options for energy supply, and few incentives to alter behaviour.

Therefore, despite the potential magnitude of climate change impacts, actors often have little incentive to incorporate adaptation into decision making. Encouraging an active response to these challenges for both public and non-governmental actors will require governments to promote and showcase the benefits of new services and products offered by energy-efficient manufacturing and renewable energy sources, as well as highlighting the mitigation potential of forestry and reforestation projects. These initiatives include creating awareness in the relevant actors of the economic advantages of active participation in the green economy, the Clean Development Mechanism (CDM), and reducing emissions from deforestation and forest degradation plus (REDD+) projects, and providing them with technical and capacity-building support.

This said, however, the economic benefits to be gained from a move towards a green economy should not be at the detriment of local adaptation capacity needs. Currently, African governments seem to be responding more to the macro-economic needs of the state and therefore pushing an aggressive agenda on the development of clean energy and technological and managerial responses to climate change. Where national interests in adaptation are demonstrated, governments again push for technology transfer and capacity-building initiatives targeted at government agencies, multilateral corporations and sophisticated sectors, ignoring the local adaptation capacity needs of vulnerable communities, which are rather micro-level concerns. The most marginalised groupings, such as subsistence farmers and communities dependent on natural resources for their livelihoods, must be central to all national green growth strategies.

Addressing climate change vulnerability and adaptation is a highly politicised and complex issue that requires an in-depth look at the underlying causes of Africa's vulnerability. It points to the structural causes of poverty, poor economic and agricultural performance, and other variables that weaken Africa's resilience. At the core is the issue of resource tenure and the need to revisit land policy and land governance in order to address questions surrounding access to land and natural resource revenues for the benefit of local communities. The land question is even more urgent, given an increase in demand arising from food crises, energy insecurity and the emerging carbon finance markets.<sup>7</sup> Further analysis needs to be done on the impact of the privatisation of land, restricting the mobility of pastoralists and other community members whose livelihoods are directly dependent on natural resources, as well as the governance issues associated with allocating the best arable land to commercial farmers and land grabbing by large international corporations.

## Political Will and Commitment at Highest Political Level

The apparent conflict between the need to address climate change and achieve development objectives presents a dilemma for democratic governance in SSA (and throughout the developing world), as the body politic in each state has to pay substantial initial costs for mitigation and adaptation programmes with a view to reap long-term gains. This requires leaders to look beyond electoral cycles and mandated terms, and educate their communities – particularly those most vulnerable to climatic threats – to accept the necessary policy changes and fiscal consequences of adaptation projects. Given other pressing issues in the developing world, this is generally not the priority of incumbent administrations.<sup>8</sup>

Firstly, it is difficult for governments to convince the general public of the quantifiable impact of adaptation strategies. Voters rarely consider the effects of climate change as being more important than other socio-economic issues. As a result, climate change adaptation is often left unaddressed by political parties. Adaptation costs, for example, are usually expressed in monetary terms, while the benefits of effective adaptation strategies are typically quantified in terms of avoided climate impacts, and expressed in non-monetary terms, such as changes in crop yield, welfare and the percentage of the population exposed to climate risk. It is even more difficult to convince the incumbent administration, as effective adaptation is costly and will require significant funding and assistance from all players in the bilateral and multilateral development community. Often money is not additional, and digs into the development assistance from existing partners for other pressing needs.

Secondly, there is an inverse relationship between the responsibility for climate change (historical and current emissions) and the vulnerability to its impacts. This poses serious questions about climate justice, global equity and responsibilities, and has led to contentious disputes between the global North and South. However, with the North's reluctance to accept the 'polluters pay' principle, Southern Africa will continue to experience the adverse impacts of climate variability that threatens to destroy the foundations of its economies and the livelihoods of millions of people. Adaptation activities to minimise climate change risks are essential and urgent, and need to take place locally and regionally, despite a lack of funding from the West. Member states of the SSA region are encouraged to recognise these vulnerabilities and

impacts and to use the information available to inform their high-level action and policy decisions. Climate change adaptation needs to be recognised as a priority for African countries, which are, understandably, preoccupied with more immediate economic challenges and more pressing development needs on their domestic and regional fronts. These priorities need to be acknowledged in appropriate instruments, like national adaptation programmes of action (NAPAs) and regional cooperative strategies and policies. Adaptation needs to be mainstreamed in other development activities. This will be referred to later in this chapter.

Because of time lags in the global climate system, no mitigation effort will prevent climate change from happening in the next few decades.<sup>9</sup> In fact, its effects are already apparent. On the other hand, adaptation cannot prevent the accumulation of harmful GHGs. Adaptation and mitigation action must occur simultaneously, and Africa needs a mix of strategies that includes mitigation, adaptation and technological development and research. Furthermore, it should push a pro-poor adaptation agenda, one that includes climate-resilient poverty-reduction schemes. These actions require a serious long-term commitment from the incumbent governments in SSA.

As a result of these needs – and others – it is essential that there is an effective leadership present on climate change adaptation, that will help define responsibility for prioritising, supervising and implementing proposed strategies, and for pushing forward adaptation actions.<sup>10</sup> Governments, which are ultimately responsible for the welfare of their citizens, should take a lead in initiating adaptation strategies. Governments should also play a coordinating role in including other important stakeholders in the climate change adaptation debate. Ziervogel, Shale and Du warn that effective adaptation should be more decentralised, with further authority given to those more vulnerable at the community levels. Furthermore, although government policy is emerging on climate adaptation at the national, provincial and city levels, there is little focus on practical adaptation. This highlights a gap in the constitutional mandate for adaptation action and brings to light the lack of legal instruments to guide it.<sup>11</sup> This implies that adaptation policy requires greater transparency in terms of the roles that need to be played and who is best suited to them. Ziervogel, Shale and Du for example, highlight the important role that the non-governmental organisation (NGO) community can play in terms of providing oversight of government and highlighting the urgent needs of those most

vulnerable. This role necessitates improved understanding of the types of adaptation needed at different scales and how government can support non-governmental responses. In this regard, there is an important role to be performed by political opposition and members of parliament in holding the executive to account in terms of monitoring the implementation of proposals and highlighting the needs of the poor.

Adaptation strategies will not be successful unless there is a willingness to adapt among those affected, as well as consensus regarding which types of actions are appropriate. Adaptive capacity, therefore, depends on the ability of a society to act collectively and resolve conflicts between its members – factors that are heavily influenced by governance. Governments have a valuable role to play with regard to encouraging and enabling further private-sector engagement.<sup>12</sup> Business is critical to the climate change question, and collaborative projects between the public and private sectors are a good way to get interested parties involved, especially if there are initiatives to assist with start-up grants and loans for renewable energy projects. Also, governments can use market mechanisms to provide incentives to promote investments in the green economy or to provide penalties for those that do not comply with the necessary provisions.

## **Difficulties of Planning for Climate Impacts: Inconsistency Between Policy and Planning Horizons**

Planning horizons affect how far into the future a risk assessment may be projected and relate to the lifetime of decision making associated with a particular activity (i.e. how far into the future it is planned). Therefore, it is important to analyse how African policy makers incorporate climate change into long-term planning<sup>13</sup> and how they envisage, if at all, reconciling policy and planning horizons.

According to Jones and Mearns, there is tension between the long-term needs of sustainable development and the short-term needs of economic and policy development. The authors suggest that the same activity can be affected by several planning horizons used by different stakeholders. For example, in the infrastructure sector, there are different time horizons for financial planning, urban planning and engineering. The same is true in a water-resource or catchment-based assessment: the planning life of water storages may be approximately 50 years, but planning for supply may only be 5 to 15 years. A risk



assessment may alternatively create scenarios based on a variety of time horizons, such as 2020 and 2050, to accommodate both the water policy and infrastructure horizons respectively.

Planning time frames cannot be created in isolation – they need to be reconciled with policy planning and intentions. A policy horizon is related to the period of time over which a particular policy is planned to be implemented. This may not be the same as a planning horizon. Most natural-resource policies are implemented over periods of 5 to 15 years. Risk assessment may be extended over a longer planning horizon, but adaptations developed to manage those risks are likely to be applied over short-term policy horizons. Jones and Mearnes explain that these long-term outlooks are important because to ignore strategic objectives in favour of exclusively short-term management may lead to incremental changes accumulating in irreversible outcomes. If the existing planning horizon does not extend beyond the policy horizon, assessment of the potential risks under climate change may be used to alert policy makers to the value of taking a long-term view. Planning and policy horizons influence the choice of climate scenario.<sup>14</sup>

However, Jones and Mearnes make it clear that if adaptations can serve both short-term policy needs and long-term strategic objectives, the likelihood of a sustainable outcome is maximised. If adaptation is incremental, then policy horizons can be updated using adaptive management, by reviewing short-term actions in the light of new information about long-term outcomes. If irreversible changes with significant consequences are possible, or if retrofitting infrastructure at some future time is likely to be too expensive, then adaptation may need to anticipate long-term changes almost immediately. Policy makers need to be aware of this and take it into account when making decisions on climate change and adaptation.

## **Governance Challenges: Engaging a Multitude of Stakeholders in the Adaptation Process**

Stakeholders are central to the adaptation process. According to Conde and Lorsdale,<sup>15</sup> adaptation occurs through public policy making and decisions made by stakeholders, including individuals, groups, organisations (governmental agencies or NGOs) and their networks. All the relevant stakeholders need to be brought together to identify the most appropriate forms of adaptation. Analysing the capacity of stakeholders to cope with and adapt to climatic events is fundamental to

characterising current and possible future vulnerability. Understanding the role of stakeholders in the decision-making process will assist in the implementation of adaptation policies.

According to Hemmati, stakeholders are ‘those who have interests in a particular decision, either as individuals or as representatives of a group. This includes people who influence a decision, or can influence it, as well as those affected by it’.<sup>15</sup> The principal resource for responding to climate change impacts is people who contribute their knowledge and expertise. Collectively, the research community and stakeholders can develop adaptive strategies by combining scientific or factual information with local knowledge and experience of change, as well as responses over time. This process requires time to build trust between the groups and individuals involved, and can be empowering, as solutions are worked out collaboratively. Participatory initiatives are more likely to be sustainable because they build on local or indigenous capacity and knowledge, and because the participants have ‘ownership’ of any decisions made and are thus more likely to comply with them. In this regard, traditional leaders play a significant role in garnering rural support for climate change adaptation ventures. The business sector is also a key stakeholder and should be central to the decision-making process.

### **Common barriers to adaptation at local level**

Adaptation is ultimately a localised phenomenon. It is driven by the need for people to adapt to the local manifestations and impacts of climate change, which will be mediated by physical geography and local social, economic and political environments. Governments, NGOs, business and other bodies should address how they can enhance the capacity of systems (i.e. people) to adapt reactively and autonomously by creating enabling environments for adaptation. Such an approach must recognise that people will pursue adaptation strategies appropriate to their individual circumstances and that adaptation may be unpredictable. Working closely with local communities through stakeholder engagement can help decision makers gain greater insight into the communities they serve. In turn, the communities can learn how the decision-making process works and how they can influence it effectively.

The process of working and achieving things together can strengthen communities and build adaptive capacity by developing awareness of the issues within communities, as well as finding ways to address them. It can reinforce local organisations and build confidence, skills and the

capacity to cooperate. This way, it increases people's potential for reducing their vulnerability. This, in turn, empowers people and enables them to tackle other challenges, individually and collectively.

Although local coping strategies are critical for adaptation to climate change, most government policies tend to undermine them, thereby weakening the resilience of local communities to the impacts of climate change. The local knowledge, social networks, traditional institutions and local biodiversity that are used for coping are often ignored by the formal financial, technological and institutional frameworks of most countries. Certain critical elements of local adaptation strategies employed by local communities, such as flexibility and seasonal mobility, are undermined by, for example, the promotion of specialised agricultural production of single crops for export at the expense of crop diversification by small-scale farmers.

### **Common barriers to adaptation at national level**

Legislative and implementational frameworks for adaptation are often hampered by centralised forms of decision making; a lack of ownership and continuity of the adaptation agenda; a lack of transparency and engagement with stakeholders at different levels; a shortfall in human capital; and a lack of government finance and local political expediencies.

It is important to closely examine a state's institutional framework or make-up. In other words, it is essential to identify the institution responsible for adaptation, clearly define its mandate and assess its human capacity, financial resources, and organisational effectiveness in conveying different sectoral bodies.<sup>16</sup> For example, South Africa's climate-related decisions were previously made in one ministry (the Department of Environment and Tourism), which was under-resourced and overburdened with a number of pressing issues. This is the case for most countries in Southern Africa that have adopted a 'silo' approach when dealing with climate change and environmental sustainability, and which lack the appropriate mechanisms to adopt inter-departmental cooperation and coordination. At this level, the public bodies responsible for climate change and development need to make a greater effort to include climate change adaptation in national planning, policies and strategies. There has been progress made in incorporating NAPAs into poverty-reduction strategies papers.<sup>17</sup> There is also an important coordinating function necessary at the national level. In South Africa's case, the National Planning Ministry should examine experiences and models of best practice in ongoing climate

risk management in the disaster risk reduction, health, water, agriculture, infrastructure, energy and food security sectors. Furthermore, adaptation policies should be institutionalised and not ‘owned’ or ‘driven’ by a particular individual or ministry. This will guarantee the continuation and better harmonisation of adaptation measures.

Within the state system, social institutions and arrangements that discourage concentration of power and prevent marginalisation of sections of the local population are very important. These arrangements ensure the representativeness of decision-making bodies and maintenance of flexibility in the functioning of local institutions. Furthermore, successful mainstreaming may require new laws and regulations or the improvement and enforcement of existing regulations. Environmental legislation needs to be harmonised in this regard. Another important function of the state will be to carefully monitor and evaluate the implemented adaptation measures to assess what is working and what is not working, and why.

Organisations at the sub-regional and pan-African levels also have a crucial role to play, considering the transboundary nature of climate change and adaptation strategies. The African Union (AU), the New Partnership for Africa’s Development (NEPAD) and other institutions at the regional level (including SADC) must ensure the integration of climate change adaptation into their sectoral programmes. This may be advantageous, especially in terms of leveraging economies of scale (common information and responses) and the collective lobbying for more ambitious mitigation commitments at international level. A regional response can identify transboundary ‘hot spots’ and deal with the migration of vulnerable people or climate refugees. It is important to formalise this in an institutional arrangement to encourage a platform and structure to respond to transboundary issues (e.g. shared water resources).

Although there have been ongoing attempts to finalise and coordinate regional and continental adaptation responses and negotiating positions, there is still an absence of sufficient, consistent policies at this level. Transnational institutional arrangements are bound by national political interests and may constitute a barrier to shared consensus building at the SADC level.

## **Uncertainties in Climate Science Exacerbate Challenges**

With the growth and recognition of the role of adaptation in recent years, a body of international research has emerged that focuses on an

array of geographical and sectoral adaptation policies (including data specifically relating to Africa). Adaptation science and technology is advancing in all sectors, and an adaptation community of practice is growing rapidly.<sup>18</sup> Nevertheless, despite the growth in awareness and knowledge, there is still uncertainty about climate change science. Questions remain about emission scenarios; the rate, magnitude and spatial distribution of climate changes; incremental change and variability; and extremes. According to Burton, this has been complicated further by the emergence of new science, such as ocean acidification and tropical cyclone intensity, and their respective impacts on climate change.<sup>19</sup>

At the national or state level, governments and institutions will undertake a combination of planned and reactive adaptation, in which lessons learnt from past hazard events are incorporated into forward-looking adaptation strategies. Climate projections will play a key role in planning for future climate change, facilitating anticipatory adaptation to new hazards and informing ongoing adaptation to familiar evolving hazards. Historical records will be of great value in identifying climate trends and ‘early warnings’ of climate change. It is, therefore, essential that incumbent governments place importance on accurate climate information for planning their adaptation strategies, and that they recognise that a system’s capacity to adapt to climate change will be heavily influenced by its ability to collect and interpret such information.

## **Enhancing a Country’s Adaptive Capacity**

According to Brooks and Adger, the adaptive capacity inherent in a system is defined by the ‘set of resources available’ for adaptation and the ‘ability and capacity’ of that system to use these resources effectively in the pursuit of adaptation. Such resources may be natural, financial, institutional or human, and might include access to ecosystems, information, expertise and social networks. However, the realisation of this capacity or the actual adaptation potential may be hampered by external barriers.<sup>21</sup> This issue will be addressed further in this chapter. At the local level, such barriers may take the form of national regulations or economic policies that prevent individuals and communities from acting or make certain adaptation strategies unviable or challenging to implement. For example, South African green-energy producers are eagerly awaiting the necessary policy architecture that supports their inclusion as independent power suppliers to the national grid (in the form of a renewable energy feed-in tariff). These national policies – or rather the lack of them – are preventing

individuals and companies from harnessing green-energy alternatives for South Africa. Furthermore, in most countries in SSA, there is a lack of dedicated frameworks and strategies on national climate change adaptation. These are essential in order to provide an enabling policy environment for the implementation of adaptation strategies.

Furthermore, Brooks and Adger explain that the implementation of adaptation strategies requires resources. These include financial and social capital (strong institutions, transparent decision-making systems, formal and informal networks that promote collective action); human resources (labour, skills, knowledge and expertise); and natural resources (land, water, raw materials and biodiversity). The types of resources required and their relative importance will depend on the context within which adaptation is pursued, on the nature of the impacts faced and on the nature of the adaptation strategy.

Adaptation strategies will not be successful unless there is a willingness to adapt among those affected, as well as a degree of consensus regarding what types of actions are appropriate. Adaptive capacity, therefore, depends on the ability of a society to act collectively – factors that are heavily influenced by the leadership of a democratic government and awareness of the issue at hand. For example, adaptive capacity can be undermined by a leader's refusal to accept the risks associated with climate change, or the denial of key political actors to accept responsibility for adaptation. Decision makers (followed by their electorates) will not pursue potentially disruptive and expensive adaptation strategies unless they are convinced that they are necessary. Such refusals may be ideological in nature, or the consequence of vested interests denying the existence of risks or responsibilities associated with climate change. Therefore, large-scale structural economic factors, prevailing ideologies, engaged leaders and accurate data and information play a vital role in determining which adaptations are feasible and what constitutes a barrier to implementation.

It is important in this discussion to question the measures, policies and strategies that enhance adaptive capacity and encourage autonomous adaptation. The aim of capacity development projects is to create resilient and flexible systems that will better prepare communities to adapt or cope autonomously, without too much external intervention (this excludes financial assistance to poor countries and technology transfer to improve their ability to adapt). Capacity enhancement will facilitate the efficient implementation of adaptation strategies by reducing obstacles and rendering people more receptive. These principles should be at the

heart of methods used to enhance adaptive capacity, which are a prerequisite to implementing adaptation strategies and measures.<sup>20</sup>

In order to enhance adaptive capacity there needs to be adequate information on the nature and evolution of the climate hazards faced by a society – both historical climate data and information about future climate change. Scepticism about the reality of climate change needs to be overcome in SSA through the dissemination of information relating to the science of climate change. According to Brooks and Adger, there is a need for clear communication between scientists, political parties, decision makers and other stakeholders about the nature of anticipated climatic changes and the risks they pose to society. Training in science communication, as well as funding of scientific research and technology need to be increased and prioritised. Keeping reliable, detailed meteorological records which may be used to identify climatic variations and trends in multi-decadal timescales, will help facilitate increased awareness.<sup>21</sup> Climate scenarios and socio-economic scenarios will also be useful for visualising the potential impacts of climate change and their implications for stakeholders. The development of seasonal forecasting ability will enhance the capacity of those in climate-sensitive sectors, such as agriculture, to adapt.

Forecasts will become increasingly important, particularly in Africa where agriculture depends on planting crops to take advantage of short-lived wet seasons. Technology that addresses this is very useful. Uncertainty must be addressed explicitly in seasonal forecasts and in long-range climate change scenarios, and the dissemination of this information should be undertaken by an adequately staffed and funded meteorological or climate change unit. Effective media responses and the dissemination of this information to the public are essential, particularly where there is a large, widely dispersed rural population and where literacy rates are low. Awareness-raising and education are key to the process, as they help stakeholders and decision makers recognise the need for adaptation and promote willingness to engage in the identification, prioritisation and implementation of adaptation options. Political parties are integral to this process, especially in terms of convincing their supporters of the necessity and urgency of this issue.

There also needs to be better information on the changing socio-economic and development context for the individual countries/communities for which the adaptation strategies are being designed – including both past and possible future evolution. An improved understanding of the impacts of climate change, as well as the political and cultural realities

of a system, will help to highlight the magnitude of the problem, point to policy-related barriers and may lead to political will and commitment to address climate change adaptation. This would enable African leaders to better articulate this priority area for adaptation to their populations, and help government ministries articulate their needs in the global negotiations with regard to a holistic picture of the challenges at hand.

Well-informed decisions need to be made through thorough research and sufficient environmental and social risk assessments. A number of adaptations may be feasible and effective for a system or population that needs to increase its ability to cope with a climate hazard. However, for various reasons, these options may not be acceptable. In such cases, acceptability represents an important constraint on adaptive capacity.<sup>22</sup> For example, building a dam to buffer a region against drought – by storing and providing water for domestic, industrial and agricultural use – may be unacceptable for social and ecological reasons. Its construction may displace people, destroy valued ecosystems or inundate culturally important areas. Alternatively, it might be prohibitively expensive or threaten the security of communities downstream. It may lead to reduced stream flow in neighbouring downstream countries and become a source of potential political conflict. In such a case, acceptability represents the ‘weakest link’ in terms of adaptive capacity. If building a dam were the most effective, or only, adaptation measure available, efforts might be made to remove the barriers to its implementation. Such efforts might involve the relocation of threatened settlements (perhaps augmented by financial compensation), ecosystems or heritage sites, or the negotiation of water management agreements with neighbouring countries. The first step towards enhancing adaptive capacity is identifying the weakest link of the system in terms of its capacity.

## **Lobbying the North for an Effective and Equitable Outcome to Climate Change Negotiations**

The international climate change process needs to be finalised urgently so that an international framework can be put in place to support both mitigation and adaptation implementation. There is much anticipation about the leadership role of the South African government to champion climate change adaptation as a central pillar to future global agreement and encourage a pro-development agenda.

Cooperation is necessary between developing countries in SSA in order to push for delivery on commitments to the Adaptation Fund and



lobby the West. International financing, for example, is important to help countries develop their own NAPA. Financial assistance is also imperative to encourage further research and planning in adaptation.

## **Conclusion and Policy Considerations**

### **Mainstreaming climate change adaptation into existing development and poverty-reduction policies**

Positioning climate change adaptation within the environment sector alone often alienates the issue and limits its effective integration with other sectors and policies. Governments should ensure that climate change is systematically integrated into socio-economic development policy making and planning at local, national, regional and continental levels. Adaptation to the impacts of climate variability should be mainstreamed across all important policy sectors, most importantly into economic policies, development projects and international aid efforts.<sup>23</sup> The idea is to make the adaptation process a critical component of existing national development plans. In Africa the likely entry points for mainstreaming climate adaptation include environmental management plans (particularly when they incorporate environmental impact assessments); national conservation strategies; disaster preparedness and/or management plans; and sustainable development plans for specific sectors. Moreover, working through the determinants of adaptive capacity makes it clear that promoting capacity can complement or even advance the broader objectives of poverty reduction and sustainable development. The issue is to recognise and make use of an opportunity for mainstreaming.

Governments have a responsibility to formalise, adopt and implement national climate change adaptation policies. Although some countries in the SADC region have articulated their adaptation needs in their NAPAs and/or developed national climate change response strategies (based on their national vulnerability assessments), many of these responses are not official yet and assessments are outdated and incomplete. Moreover, most strategies are biased towards the biophysical aspects of climate change and neglect the socio-economic aspects that are critical for mainstreaming climate change adaptation into national economic development planning. These are typical of the first generation of national climate change response strategies.

A number of sectoral adaptation strategies have been proposed through the response strategies to address vulnerabilities in the

agriculture, health, biodiversity and water sectors. National strategies fail to adequately highlight cross-sectoral impacts of climate change and advance integrated adaptation strategies. This is often due to broader governance challenges experienced within state institutions. These include weak coordination within government departments as a result of conflicting and overlapping mandates, dysfunctional arrangements for inter-agency integration, excessive external (UNFCCC or donor) reporting requirements and inadequate financing for adaptation. Additionally, retaining skilled staff is a challenge faced by all SSA countries. Responses to adaptation do not adequately reflect the socio-economic implications of climate change, with particular emphasis on risk-prone areas and the most vulnerable groupings (such as women, children and the poor). Therefore, proposed actions do not provide for strategic interventions that would build the resilience of key sectors, vulnerable groups and ensure adaptation preparedness. With high levels of poverty and inequality in most of SSA, it is important that issues that relate to the second economy are not overshadowed by the interest of the most powerful groups, particularly if there are no political champions to speak for and represent the interests of the rural poor, small-scale farmers and the landless in the policy-making arena.

## Policy considerations

- There should be no stand-alone adaptation policy, but instead institutional arrangements to ensure continued mainstreaming of climate risks.
- Adaptation and mitigation action must occur simultaneously, and Africa needs a mix of strategies that include mitigation, adaptation, and technological development and research.
- Policies should in no way detract from the continent's development agenda, but seek to enhance it. Co-benefit models and no-regrets approaches should be used to simultaneously address environmental sustainability and economic development. This would encourage African participation in the adaptation agenda, while enhancing the buy-in from political parties and incumbent administrators (and relevant bureaucracy).
- Climate change concerns the greater good of global public and requires the cooperation of all nation states, at all levels, to effectively curb GHG emissions. However, adaptation to the impacts of climate change is local, as effects are felt by people. Therefore,

responses to adaptation need to be local, and require the urgent attention of the national government institutions. It is important to develop a people-centred approach and involve local actors in adaptation implementation.

- Capacity enhancement will facilitate the efficient implementation of adaptation strategies by reducing obstacles and making people more receptive. In this regard, the government plays a key role in removing barriers to the implementation of adaptation policies.
- A programme of research should be established to supply climate information (climate services), to supplement climate science.
- A programme of outreach and communication to local governments, the private sector and civil society should be established.

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## 2

# Political and state system barriers to the implementation of climate change adaptation in Botswana

*Elisha N. Toteng*

## Introduction

Climate change is the most significant contemporary global environmental issue to attract the world's attention. It has attracted global attention primarily by way of the escalating number of climate-related disasters, such as devastating floods and debilitating drought in arid and semi-arid environments. In Botswana, drought has been the most common form of climate-related environmental disaster. Since 2000, however, there have been more frequent incidents of flood disasters throughout Botswana. Although the science of climate change has attracted a great deal of attention, the question of political factors hindering climate change adaptation remains under-documented. This chapter sets out to discuss political barriers to climate change adaptation in Botswana, with particular focus on the political party system that has influenced policy and institutional barriers. These factors are often mutually reinforcing and indistinguishable from one another.

## Political Factors Influencing Environmental Conservation in Botswana

On paper, Botswana is a multiparty constitutional democracy. Botswana's democracy, however, has been criticised for being limited in scope. For instance, there is no political party funding by the state

to ensure that there is a level political playing field for political parties. Politics in Botswana occurs within a parliamentary, representative, constitutional and democratic republican political system. Nevertheless, the President of the Republic has enormous executive powers, and is both head of state and government. The excessive constitutional allocation of power to the president is another point of criticism of Botswana's democracy. Executive power, control and authority in Botswana are exercised by central government agencies, through local government and a host of state enterprises, while legislative power is vested in both the government and the parliament (the National Assembly).

The local government system in Botswana is administratively, but not financially, decentralised to 10 district councils (Kgalagadi, Ghanzi, Southern, Ngamiland, Chobe, Central, North East, South East, Kgatleng, and Kweneng) and five urban councils (Gaborone, Francistown, Lobatse, Jwaneng, and Selibe-Phikwe). District commissioners are represented and appointed by central government in urban and rural councils, and they work in conjunction with elected and nominated district councillors and district development committees.

One of the most significant barriers to the implementation of climate change adaptation in Botswana is that at the political level, environmental issues, in the 45 years of Botswana's independence from Britain in 1966, have not been a major area of concern among political parties. The emphasis in Botswana and in most developing countries, has been on the social and economic development issues – the 'bread and butter' issues, such as poverty, unemployment and access to social services. This trend is consistent with the global scenario. Across the world generally, except for a few developed regions, for instance Western Europe, North America and Australasia, environmental issues have for a long time not been taken seriously politically because they are not a major vote-winning factor at elections. The evidence for this is that even in developed countries where green parties have existed and thrived for a long time, they have generally remained small and marginal in terms of popular votes and representation in elective, parliamentary democratic systems.<sup>1</sup>

In Botswana several political parties have existed for four decades, but most opposition parties have remained dormant, stagnant and weak, to the extent that one political party has ruled the country for 45 years. The main political parties in Botswana in 2011, in alphabetical order, are the Botswana Congress Party (BCP), the Botswana Democratic Party (BDP), the Botswana National Front (BNF), the Botswana People's

Party (BPP) and the Botswana Movement for Democracy (BMD). The BCP was formed in 1998 as a splinter party from the BNF. The BMD, formed in 2010, is a splinter party of the BDP. As organisations that seek political power, political parties are potentially key development partners that could play a crucial role in influencing public policy, including environmental policy, under which climate change adaptation issues should be considered. In this context, it is essential to understand the role political parties play in environmental protection action in Botswana and how this could be a barrier to climate change adaptation implementation.

This chapter focuses on the two main political parties that have dominated Botswana's political landscape for over four decades, namely the BNF and the BDP. This selection is made on the basis that these two parties have been the significant contenders for state power for 40 years in Botswana up to the last general elections in 2009. It should be noted, however, that the BCP has emerged since 1998 as a major contender for political power in Botswana. Most of the other parties are new, small, insignificant and largely dormant. The limitation imposed by the choice of the two case studies is that they may not fully represent the entire political spectrum and the depth of the political landscape in Botswana. However, the case studies do adequately indicate the general lack of commitment among political parties in Botswana to pay adequate attention to environmental issues, of which climate change adaptation is a part.

## **Assessment of Political Party Manifestos for Environmental Conservation Commitment: Implications for Barriers to Climate Change Adaptation**

Political party manifestos represent a social contract between political parties and the people or the electorate.<sup>2</sup> They are usually the most widely accessible sources of information for the general public (besides the members of specific parties), and a method that parties use to market themselves to convince voters to make informed choices to vote for them. There are many other party documents, including constitutions, strategies and sector position papers. This analysis primarily focuses on party manifestos for a balanced comparison, given that most other party documents are ordinarily not widely available in the public domain for access by non-party members.

In particular, two sets of manifestos for the 2004 and 2009 general elections have been chosen for this assessment since most older manifestos are not readily available, particularly for opposition parties, which usually lack resources to produce party documents. In addition, the 2004 and 2009 elections provide recent periods for assessment and give a reflection of contemporary political party performance in the areas of the environment and climate change, which have only gained significant global attention in recent times. At a general level, the 2004 and 2009 manifesto samples are considered adequately representative of trends in mainstream political party thinking as far as environmental protection is concerned in Botswana.

## The BNF and environmental conservation

In the 2004 elections, the BNF led a pact of three political parties. These included the BNF itself, the Botswana Alliance Movement (BAM) and the BPP. This analysis assumes that the position of the BNF, as the initiator and leader of the pact, is representative of the tripartite of partners in the 2004 agreement. This is encapsulated in the pact manifesto. The BNF position on environmental issues in the manifesto can be gleaned from the section titled 'The environment' in the manifesto (see Box 2.1).

### Box 2.1 The BNF position on the environment in the 2004 elections

#### The environment

The Pact [of BNF, BAM and BPP] understands that the environment in its holistic form as an equation balanced by [a] broad spectrum of factors in complex interaction with one another, and recognition of this breadth is fundamental [to] any understanding of its protection.

There is a trend to totally separate social, economic and environmental factors at policy, planning and implementation levels. This separation has influenced actions of environmental groups in the society, industry, individual members of the community and, indeed, governments.

#### The Pact Government shall:

Make a fundamental reshape of policy decision-making in order that the environment is placed at the centre of all economic decision-making.

Develop programmes where industries contributing to the pollution of the environment will be identified and required to contribute to a fund for the continued research of environmental matters and the subsequent health problems relating to pollution. Similarly, all environmental hazards will be closely monitored, particularly the disposal of industrial and hazardous waste.

Source BNF, 2004. National Election Manifesto. Gaborone: BNF Secretariat, p.20

The information presented in Box 2.1 shows that the BNF had thought about the environment as an important issue in the 2004 general-election



manifesto. One of the obvious limitations, however, is that the BNF did not win the 2004 general elections to enable it to govern. Therefore, its election promises on the environment have not been tested at the level of policy implementation. It is, however, significant that as a major opposition political party at the time, the BNF did make a political statement on the environment. How this could affect barriers to climate change implementation adaptation is a matter of conjecture. It is clear, however, that the influence of a non-governing party in environmental policy in Botswana is almost non-existent, given that environmental issues are generally relegated to back-burner status in Botswana politics. This is a common trend in Sub-Saharan Africa (SSA) and developing countries.

In the 2009 general-election manifesto, the BNF closely equated environmental conservation with tourism, as if tourism were the only sector that depends on and adversely affects the biophysical environment. The environment cannot be limited to the tourism sector alone. There are numerous sectors that both depend and impact on the biophysical and human environments in Botswana, including agriculture, mining and land development for infrastructure to support human settlements, for example. The challenge for political parties in Botswana, therefore, is to integrate cross-cutting, inclusive political statements on environmental commitment in general, as opposed to merely adopting piecemeal sectoral statements that do not address topical environmental issues, such as barriers to implementation of climate change adaptation.

The full text of the 2009 BNF manifesto on the environment is found at Section 5 of the document. An extract is presented in Box 2.2.

### **Box 2.2 BNF position on the environment in the 2009 elections**

- a) The BNF adopts a broader view of national development process, and that a clean environment is essential to our tourism industry and our future as a nation. The BNF government will adopt an integrated approach to urban and rural environmental planning and preservation of our cultural heritage. To this end, the departments of Town and Regional Planning, Wildlife, National Parks, Land Utilisation, Museum, and Tourism, will be brought under a single administration with a comprehensive policy on environmental awareness, and education, pride and preservation of our cultural heritage. We have to be proud of our country before we can expect foreigners to do so.
- b) The BNF government shall on assumption of power exploit the tourist potential of river banks and valleys, mountain shores, fossils, caves, reefs, gorges, and other unusual landscapes by establishing tourist resorts attractions around them. The already existing plans to exploit the mythology of historical and other monuments and artefacts shall be implemented without delay. Tourist motels and rest camps will be built in their vicinity to increase tourist revenue in the economy.

Source: BNF, 2009. National Election Manifesto. Gaborone: BNF Secretariat, pp.6–7

The BNF statement on the environment in the 2009 manifesto lacks clarity and is narrower in scope than that of 2004. It does not signal how environmental concerns will be integrated to protect ecological resources, attain sustainability and at the same time meet human needs. In fact, the 2004 position on the environment was much clearer than that of 2009. As indicated, in 2009 there was a bias towards tourism as an economic activity. Tourism has in recent years grown in significance as one of the top three to five sources of revenue in Botswana's economy, which include mining and beef production. However, tourism and environmental conservation are not necessarily one and the same thing – although, like many other sectors of the economy, they are interdependent. In the final analysis, the BNF's wishes for environmental management in Botswana remain hypothetical because it has failed to garner enough political support in the national elections to enable it to govern and implement its policies.

It would seem that despite variations in its manifesto statements, the BNF's view on the management of environmental issues has generally remained the same. Environmental conservation is given peripheral and marginal attention, as if it is divorced from the many socio-economic problems that need to be addressed. Consequently, it could be argued, the approach of the BNF towards environmental management in general is a mockery, as it is narrow in scope, and has always been the same over the years, despite local and global changes in significant environmental issues, such as climate change. Environmental issues are broad in their scope, hence they cannot be holistically addressed by restricted interventions, such as tourism development. For example, there is a need to clearly show how environmental resources will be used on a sustainable basis for the betterment of the nation, as well as how all major economic sectors that are dependent on natural resources, including the agriculture, water, energy and mining sectors, will be synergised and integrated into environmental policy to attain environmental sustainability, consistent with United Nations (UN) Millennium Development Goal 7 on environmental sustainability.

## **The BDP and environmental conservation**

The BDP, or 'Domkrag', as it is affectionately called by its passionate supporters, has since 1969 in its party manifestos shown an interest in tourism development, with no serious attention paid to environmental conservation as part of a holistic development approach to ensure

sustainability. For instance, an examination of the 2004 and 2009 BDP manifestos shows that both adopt the format of the Botswana Vision 2016 in terms of structure in identifying issues considered of national concern, but there is nothing on environmental and natural-resource conservation as a major factor underlying national economic development. Under 'BDP promises for 2004–2009' (paragraph 2.9 of the manifesto), there is cursory reference to natural resources, with a reference to the fact that the BDP government shall '[p]ut in place strategies to promote, develop, preserve and exploit indigenous knowledge and technology systems, unique natural resources and practices for exploitation to support socio-economic development'.<sup>3</sup>

The 2009 BDP manifesto is similar to that of 2004, in that they are both tailored to the structure of Vision 2016. There is no improvement upon the 2004 manifesto in the 2009 BDP manifesto in terms of seriously addressing environmental and natural-resource management as a critical factor that underpins and determines economic development. It is assumed that natural resources, such as minerals, water, agricultural resources and land used for human settlement, are infinitely provided by nature, and that what is required is to manage the exploitation of these resources to guarantee development.

In the 2009 BDP manifesto there is little or no serious attention given to the issue of environmental and natural-resources conservation. For instance, paragraph 3.2.2 on 'sustainable tourism' states that '[i]t is important that Botswana appreciate the value of natural resources with which the country is endowed'.<sup>4</sup> To this end, the BDP promises that it shall 'conserve and protect all the natural resources upon which this sector [tourism] is dependent'.<sup>5</sup> Again, as in the case of the BNF in 2009, natural-resource conservation in the BDP 2009 manifesto is narrowly conceived solely in terms of tourism and economic exploitation. This has been a consistent approach within the BDP over a protracted period of time. However, political parties need to adopt positions on environmental and natural-resource conservation that are broad-based so as to permeate all major economic development sectors, and these should be clearly documented as such in their manifestos to demonstrate their political commitment and will.

Clearly, the emphasis has been on resource exploitation rather than conservation. This is consistent with environmental approaches that see humanity as removed from nature, and nature being there for humans to exploit to meet their own needs, regardless of the consequences. This approach is not unique to the BDP. In fact, in some developed countries

the lack of environmental commitment by mainstream parties has prompted the formation of green parties, for example. This has not been the case in nations with small populations, like Botswana, where there is limited political space in the opposition ranks for parties. Adding another small party to the narrow opposition political space would only serve to weaken them against the ruling party. In fact, in mature and established democracies such as the UK and the US, there are usually two dominant political parties and a few smaller ones, which may include green parties.

Like the BNF in its 2004 and 2009 manifestos, there is a misconception in the BDP of the environment as something that is far removed from day-to-day human activities. Essentially, the environmental or ecological carrying capacity of the biophysical environment is taken for granted within the BDP, since it is not addressed as a significant issue in its political manifestos, or as a holistic issue, but instead is addressed in a piecemeal and fragmented fashion.

In the 1969 and 2009 manifestos, the BDP strategy for tourism development was based on conserving wildlife, which is a valuable natural resource. The BDP government recognises tourism as one of the areas in the economy that contributes to employment and economic diversification. To this end, the BDP strives to conserve and protect through policy all natural resources on which the tourism sector is dependent.

The BDP's approach towards the environment has not been very different from that of the BNF, and just as narrow. There is also evidence of what could be referred to as environmental discrimination, in the sense that conservation and protection of natural resources, from the BDP's perspective, are done only on the basis of a resource's positive contribution towards tourism. For example, wildlife is highly protected in northern Botswana because it is the main tourist attraction.

Therefore, there is a grave and disappointing omission of environmental issues that are not necessarily key to tourism, but fundamental to the country's development. The BDP manifestos do not even speak of integration of environmental issues. This is important given that environmental issues are cross-sectoral in nature. Indeed, just like the BNF, the BDP manifestos are skewed towards social and economic issues at the expense of ecological concerns. As a result, the climate change issue generally remains unaddressed.

It is, therefore, clear that the political commitment shown by the main political parties in Botswana to the environment between 1969 and 2009 as marginal and weak. As a result, one may assume that

government policy, legislation and institutional capacity pertaining to environmental protection were not adequately facilitated in this political regime. It was not until 2002, some 35 years after independence, that the government of Botswana established the Ministry of Environment, officially known as the Ministry of Environment, Wildlife and Tourism (MEWT). The environmental policy and legislation governing the mandate of the evolving institutions under the MEWT were still being developed at the time of writing in 2011. Similarly, the reorganisation of institutions to implement the MEWT's environmental policy is a work-in-progress. From the above, it could be deduced that the identification of barriers to the implementation of climate change still need to be addressed. It is clear that climate change adaptation was not an issue in the 2004 and 2009 BDP and BNF manifestos despite the global significance of climate change. However, as a small developing country, Botswana's contribution to global climate change is marginal.

Environmental conservation commitment by political parties should be clearly articulated in political documents, such as election manifestos, to demonstrate political commitment to this issue. As the ruling party, the BDP has advantage both at political and policy level since it has been the governing party uninterruptedly for 45 years.

## **The State System in Botswana: Implications for Climate Change Adaptation**

Botswana has been described by political scientists as a 'developmental state'.<sup>6</sup> As noted by Toteng, the point in assessing the nature of the state in the context of environmental policy and the associated issues in Botswana is not to repeat what political scientists have already observed, but to indicate how certain features of the developmental state could adversely affect the implementation of environmental policy and governance in terms of mobilising participation of non-state actors, such as civil society, in environmental conservation programmes.<sup>7</sup> The questions that arise include; what is a developmental state? How does that type of state exist and function in Botswana? How could that affect implementation of climate change adaptation or mitigation initiatives?

There is no universally accepted definition of a developmental state. However, a developmental state has certain basic or common characteristics. It is argued that in the case of Botswana the state meets five out of six (i.e. over 80%) of the major criteria of a developmental state, namely:<sup>8</sup>

- relative autonomy of the state from external political influence,
- a determined elite,
- an insulated, powerful and effective bureaucracy,
- a weak civil society and
- effective management of public–private sector relations.<sup>9</sup>

Despite differences in opinion on some aspects of the nature of the developmental state in Botswana, there is agreement on most details. There are those who elaborate on the characteristics of the developmental state in general, and point out how these are manifested in Botswana.<sup>10</sup> The primary elements of a developmental state have been identified as follows:<sup>11</sup>

- A dominant government role in the development process.
- The existence of an authoritarian government directing the state administration.
- State control and mediation of workers' wage demands upon employers.
- The existence of a weak military.
- Vast foreign aid provision in the state's infancy.
- The expansion of social services and infrastructure.
- Increases in the rates of growth in gross national product (GNP) and per capita income over an extended period of time.
- A national development plan that serves to unify the various sectors of economic, social and infrastructural development as a whole.
- Increased manufacturing output and government effectiveness in the delivery of goods and services.<sup>12</sup>

Unlike other developmental states, such as those of South Korea, Taiwan and Hong Kong, Edge asserts that 'Botswana has been unable to stimulate a large-scale, internally generated, competitive manufacturing sector'.<sup>13</sup> Furthermore, despite the general agreement among political scientists on the existence of the developmental state in Botswana, there is some disagreement on one major aspect: democracy versus authoritarianism. On the one hand, Edge asserts that 'the existence of an authoritarian government is a characteristic feature of the developmental state',<sup>14</sup> and he does not refute this aspect in the case of Botswana. On the other hand, Tsie argues that 'Botswana is a democratic developmental state in the sense that it has promoted rapid economic growth

and capitalist development without abandoning democratic norms and practices'.<sup>15</sup> With regard to the environmental management question in Botswana, one thing is certain: the democratisation of environmental issues and the attendant agenda has for the most part during the post-colonial period been very limited. Lack of democratisation in environmental governance has been demonstrated by the state's exclusion of community participation in wildlife conservation in protected areas.<sup>16</sup> The involvement of significant non-state actors, such as environmental NGOs and the private sector, in environmental policy and decision-making processes 'remains marginal... minimal if not nil'.<sup>17</sup> It is clear that if the environmental policy-making process is weak, emerging and topical environmental issues, such as climate change adaptation, will remain neglected and mitigation barriers will also persist.

Non-state actors in Botswana, particularly local communities, have little power to influence decision-making and policy processes concerning environmental management issues.<sup>18</sup> Part of the problem stems from the fact that 'the political leadership has remained remarkably aloof from the deeper issues of resource conservation and environmental protection'.<sup>19</sup> Likewise, rather than providing sufficient opportunity for local communities to define environmental problems and set the environmental agenda, the state in Botswana invariably dominates the scene, often with marginal and insignificant participation of local communities.<sup>20</sup> To the above list of characteristics of the democratic developmental state in Botswana, one aspect has consistently been neglected in Botswana's development policy until recent years, namely the environmental question.<sup>21</sup> Part of the problem has been attributed to the fact that Botswana's politicians have been more inclined to allow the environmental conservation agendas to be defined by expatriate advisers.<sup>22</sup> However, Botswana's future social and economic development will depend significantly on whether public policy can balance environmental exploitation with natural-resource conservation and management.<sup>23</sup>

An implicit question is, of what relevance is understanding the developmental state in Botswana? This type of state has been able to spearhead vigorous and sustained economic growth and a liberal democratic political climate. Ironically, however, there has not been similar success in addressing the problem of environmental degradation.<sup>24</sup> As a result, it could be concluded that climate change barriers persist within the monolithic developmental state system dominated by central government in environmental policy-making processes and decision making.

## **Botswana's National Conservation Strategy: The Environmental Policy**

Botswana's National Conservation Strategy (NCS), adopted in 1990, is so far the country's only semblance of an integrated environmental policy. Among the primary goals of the NCS are, firstly, to increase the effectiveness in use and management of natural resources and secondly, to integrate the work of sectoral government ministries and other interest groups to conserve natural resources.<sup>25</sup>

The Department of Environmental Affairs (DEA) is the secretariat under the NCS Advisory Board. The main function of the board is to coordinate and advise both government and the private sector on all environmental issues. The agency services the board and coordinates the execution of its decisions.

It should be noted that, by and large, the DEA is merely an advisory environmental body with limited statutory powers under the Environmental Impact Assessment Act of 2005. The DEA, therefore, does not have legislative powers to enforce its will on other government departments. This scenario points to a relatively weak national-level environmental management policy and institutional framework. There are, however, sister departments to the DEA that are vested with statutory powers on various aspects under the MEWT, including the Department of Waste Management and Pollution Control, the Department of Forestry and Range Resources, and the Department of Wildlife and National Parks. The DEA is meant to be the coordinating body through the NCS, but its effectiveness is hampered by the lack of an integrated environmental law at the time of writing. The implications of recent institutional changes in the environmental management sector are elaborated below.

Since the inception of the NCS, the environmental management system in Botswana has been changing incrementally, particularly since the country has become a signatory to numerous multilateral environmental agreements since 1994. First, the NCS Coordinating Agency (NCS-CA) was established as an executive arm for implementing the strategy under the then Ministry of Local Government, Lands and Housing. The NCS-CA has since been transformed into the DEA. The NCS board was also established to be serviced by the NCS-CA. Second, the Waste Management Act was promulgated in 1998. Subsequently, the Department of Waste Management and Pollution Control was established in April 1999 to implement the Act. Third, and most significant, was the establishment



in 2002 of the MEWT to focus the country's attention and efforts on environmental conservation and management issues. Whether these changes have improved the effectiveness of the country's environmental governance is subject to some contestation. However, the environmental policy and management regime in Botswana has been under pressure to change and respond rapidly to global forces of environmentalism. This is in contrast to the period before the NCS was established (1990) and before the UN Conference on Environment and Development (UNCED), held in Rio de Janeiro, Brazil, in 1994.

## **Human Perceptions of Climate Change Adaptation: Implications for the Removal of Barriers to Climate Change Adaptation**

The results summarised in this section are drawn from a survey report conducted between 2003 and 2005.<sup>26</sup> It set out to assess communities' perceptions to their vulnerability and adaptation capacity to drought as a climate change and variability-induced recurrent disaster in the Limpopo Basin in eastern Botswana. The communities surveyed include the Central District (based on the Bobirwa Sub-District sample), and Kgatleng and the North East districts.

A sample of 1 264 households were interviewed in the entire study area. A minimum target of 400 households was to be interviewed in each of the three districts. The households were distributed as follows: 409 in Kgatleng District; 414 in Central District (Bobirwa Sub-District); and 441 in the North East District. The emphasis in the sampling procedure was not just to achieve statistical representation; there was also a need to achieve spatial representativeness. These considerations were important because the wider study of which the social survey was a component relied on multiple complementary data-acquisition methods, namely focus groups, key informant interviews and documentary analysis. The results summarised in this section, however, are only for the social survey component. These are significant, in that they indicate community perceptions about their vulnerability to drought as a climate-induced natural disaster, and particularly how drought affects the subsistence agriculture sector. These results also signal how communities in the study area felt about government policies and the institutional framework that affect their vulnerability to drought and their adaptation capacity. From this, observations were drawn as to whether

or not the policy and institutional frameworks are barriers to climate change adaptation with regard to drought.

The main findings of the study are summarised in the following sections.

### **Perceptions on vulnerability to drought**

- Botswana was viewed as a drought-prone country by a large majority (80,7%) of respondents (N = 1 264).
- The occurrence of drought was attributed to poor rains.

### **Perceptions on government agricultural policies and programmes**

- Some past policies and programmes that existed at the time of the fieldwork in 2004 relevant to promoting livestock production were known to respondents. Examples include the Financial Assistance Policy (FAP) and the Services to Small Livestock Owners in Communal Areas.

The FAP (aspects of which are now part of the Citizen Entrepreneurs' Development Agency [CEDA]) was not really an agricultural policy, since it was meant to assist citizens with financial support for entrepreneurial capacity development outside the agriculture sector. CEDA had similar objectives to the FAP, but the time targets were different according to the scales of enterprises, with different financial assistance ceilings. Some agricultural projects, however, did benefit from the FAP. As a non-agricultural policy, the FAP and its derivatives did not factor in communities' vulnerability and adaptation capacity to drought.

- There was low awareness among respondents of policies that promoted agricultural production in general, but particularly so in the case of the livestock sector. For instance 31,2 per cent of the sample (N = 1 264) mentioned the Arable Lands Development Programme; the Tribal Grazing Land Policy was known to 9,6 per cent; 39,4 per cent knew about the Accelerated Rain-Fed Arable Programme; the National Master Plan for Arable Agriculture and Dairy Development (NAMPADD) was identified by 15,6 per cent; and less than 5 per cent were aware of the National Agricultural Land Fencing Policy. It could be concluded that the generally low level of awareness among respondents about

agriculture-sector policies acts as a barrier to the implementation of adaptation initiatives.

- It is likely that the low level of awareness about livestock production policies was because of the generally low levels of livestock ownership, particularly cattle, the most significant stock in financial terms. Another factor could be the low levels of formal education among the respondents. Some programmes (e.g. NAMPAAD) were relatively new at the time of the study in 2004, hence most communities were not aware of them.

### **Perceptions on non-agricultural policies and community adaptation to drought**

- Negligible number of respondents (6,6%; N = 1 264) were convinced that some government policies worsened community vulnerability to drought. The Drought Relief Programme and the CEDA were mentioned in this respect.
- The Drought Relief Programme was criticised for low and late payments, and for its ill-timed projects, in that they coincided with the planting season for arable farmers. The result was that some farmers, and those who could provide labour, would neglect crops to earn a quick but unsustainable cash income from the programme.
- The CEDA was equally condemned for the complex application procedures for those who wished to obtain financial assistance. There was a perception that the CEDA interest rates on loans were high (even though the CEDA interest rates are below those of commercial banks). In any case, most commercial banks in Botswana do not provide financial assistance to subsistence farmers. The CEDA was generally perceived as inaccessible to most poor people in rural communities, which made them more vulnerable to drought.

### **Perceptions on impacts of government policies on adaptation capacity to drought**

- Among the policies that were seen as helpful in reducing communities' vulnerability and increasing adaptation capacity to drought were the Drought Relief Programme, and the Old Age Pension Scheme.

- Two-thirds (66%; N = 1 264) argued that the Drought Relief Programme created cash-income job opportunities for vulnerable people.
- The Old Age Pension Scheme was said to be helping citizens aged 65 years and over with the monthly payment of P150 (about US\$25) subsistence income in 2004. Low levels of awareness of this programme might be due to the low value attached to the subsistence income derived from it.
- The various programmes for orphans and the destitute were regarded as helpful by very few people. Only 8,1 per cent mentioned the Orphans Programme; 17,1 per cent specified the Destitute Programme.
- Low levels of awareness about the Orphans Programme might be due to the fact that it does not directly target household vulnerability associated with drought. In addition, it is probably because of the stigma associated with HIV/AIDS, since most orphans whose parents are victims of HIV/AIDS are provided for under this programme.

### **Perceptions on the role of institutional frameworks on adaptation to drought**

- The level of awareness of the institutions was generally high (77,8%; N = 1 264). However, awareness about the specific policies and programmes implemented by the institutions was low.
- The Village Development Committee (VDC) was the most widely known institution among local communities. Of the respondents, 74,7 per cent specified that the VDC facilitates social services from the government to destitute persons although this is not the primary purpose for which this structure was established. (The VDC was established to facilitate socio-economic and physical development at the village level.)
- The roles of other institutions were not well known. For example, the Farmers' Committee was known by only 23,3 per cent; the Home-Based Care Committee was known to only 15,4 per cent; the roles of the Village Health Committee and District Multi-Sectoral Aids Committee were specified by less than 10 per cent of respondents.
- Failure by communities to adequately associate institutions to help residents cope with drought is due to the fact that most of

these institutions were not set up specifically to address drought or drought-related issues. There is, therefore, a need to recognise drought as a cross-cutting issue in Botswana so that institutions can factor it into their plans for rural and community development. Failure to do so would render the institutions a barrier to implementing drought mitigation.

The main outcome of the study was that for a significant period of time, communities have been adversely affected by drought, particularly the subsistence-agriculture sector. However, communities generally did not understand the wider notion of climate change. Communities were aware of several government assistance programmes, but these programmes did not specifically deal with climate change concerns, except for the Drought Relief Programme.

## **Conclusion and Policy Considerations**

This chapter set out to examine the nature of politics in Botswana to establish how it may affect environmental policy, to which climate change adaptation is intrinsically linked. It was found that – on paper – Botswana’s political system embraces multiparty democracy. It was also shown that the political system in Botswana has lived up to multiparty electoral democracy for more than 40 years in terms of holding regular general elections. However, environmental issues in general have not featured prominently because they are not considered a significant vote-winning factor by the main political parties. In part, this is because environmental issues, such as climate change, are perceived as remote and technical, and do not attract voters in the same way as social and economic issues. Although among technocrats, and very slowly among politicians, there is some recognition of the real and likely impacts of climate change on water and food production, for example, there is still a long way to go before these issues will be considered serious enough to warrant immediate political attention. The country is yet to see the issues featuring prominently in election manifestos, for instance.

Socio-economic issues cannot, however, be divorced from the bio-physical environment; they are intrinsically linked to and dependent on it. There is an apparent neglect of environmental and climate change adaptation issues in Botswana’s political discourse, which invariably impinges on other aspects, such as environmental policy. Flowing from these observations, it is conceivable that climate change, a globally

significant and topical issue, has been neglected because of its perceived insignificant political value. In official circles in government, however, there is a growing awareness of environmental issues, including climate change. The efforts to address this issue are, nevertheless, too isolated, fragmented and piecemeal to enable systemic public awareness and action on climate change adaptation issues. Consequently, there are human-dimension barriers to the implementation of climate change adaptation. These need to be addressed in a concerted and systematic fashion if they are to be removed and to enable Botswana to contribute effectively to both regional (i.e. SADC and SSA) and global environmental efforts for environmental protection. The various environmental, financial and technological benefits will not be realised until the climate change issue is mainstreamed into the political process.

Even as Botswana was preparing for the 17th Conference of Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC) in South Africa in 2011, there were media reports indicating that climate change is not taken seriously in political circles. For instance, there is a report carried in the *Mmegi* newspaper of 19 October 2011, which reads in part 'The chairman of the climate committee and member of Parliament for Francistown South... has decried the lack of local political commitment and seriousness towards climate change'. The report also says that the same concern was corroborated by a senior official in the Botswana Metereological Services Department, the focal point climate change in the country. Surely, if there is no political commitment it is unlikely that any country will make progress in removing barriers to climate change adaptation and mitigation measures.

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- 21 Toteng, 2001.
- 22 Yeager, R., 1993. Governance and the environment in Botswana: The ecological price of stability. In Stedman, S.J. (ed.), *Botswana: The political economy of democratic development*. Boulder and London: Lynne Rienner Publishers, p.127.
- 23 Ibid., p.130.
- 24 Tsie, 1998; Molebatsi and Toteng, 1998, Introduction.

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- 26 Toteng, E.N. and Mathope, G., 2005. *Vulnerability and adaptation capacity of rural communities' livelihoods to drought in the Limpopo River Basin of eastern Botswana: Case studies of Bobirwa, Kgatleng and North East Districts*. Gaborone: University of Botswana, Department of Environmental Science.



# 3

## Social barriers to adaptation

### Exploring implications and identifying options for adaptation policy across the SADC region

*Lindsey Jones*

#### Introduction

The impacts of climate variability and change are already being felt across much of Southern Africa and are projected to intensify over the coming decades. The various threats, coupled with wider development pressures, are likely to exacerbate already complex socio-ecological relationships. With this in mind, for many people and communities across the Southern African Development Community (SADC) region, adaptation is not an option but a necessity. In trying to facilitate successful adaptation at various levels, governments need to be aware of the various obstacles that exist. In the SADC region, financial, informational and natural limits to adaptation act as serious hurdles to the implementation of sustainable adaptation policies, each of which is fairly well documented. However, social and cultural barriers to adaptation have so far been given little in the way of attention, and have not been well researched.

This chapter explores the influence and implications of social barriers to adaptation, using insights drawn from recent literature and field studies across Africa. It highlights the roles of social institutions in influencing how individuals choose and are allowed to respond to climate shock and stress within Southern African communities, and examines how restrictive social environments can prevent successful adaptation. Finally, it provides recommendations for adaptation policy to address and overcome social barriers to adaptation for Southern Africa.

## What are Social Barriers to Adaptation?

It is easy to assume that, when faced with a threat to one's livelihood, an individual will make rational decisions based on a clear hierarchy of structured and rational preferences. Yet, evidence from various fields of the social sciences tells us that the influence of social structures and characteristics – such as social norms, institutions and perceptions – can play a large role in determining people's decision making. Indeed, research into natural-resource management shows that 'barriers to community or individual action do not lie primarily in a lack of information or understanding alone, but in social, cultural, and institutional factors'.<sup>1</sup> This is also the case for adaptation, and how an individual may choose to adapt – or not to adapt – to perceived threats relating to climate variability and change. With this in mind, individuals need not only knowledge on how best to cope and adapt, but also the motivation, the right institutional environment and the entitlement to do so.

This chapter is concerned with the social and cultural processes that govern how people react to climate variability, whether this is in the form of prolonged drought, heavier and more uncertain rainfall or changes in seasonality and temperature. In their simplest form, social barriers relate to the social characteristics that prevent individuals or groups from seeking the most appropriate and logical forms of adaptation action. Within this group are cognitive, normative and institutional barriers, each of which plays a large role in influencing, and in some cases restricting, the options available for adaptation and the adaptive capacities of particular groups and communities (see Table 3.1 for examples of each).

**Institutional barriers** to adaptation relate to the structure and governance of institutions in terms of influencing how individuals are allowed to respond to climate variability and change. In this chapter, institutions are taken to represent the 'rules of behaviour' that govern belief systems, norms and behaviour, and organisational structure.<sup>2</sup> Social institutions can be both formal and informal in nature, and are very diverse in their appearance. Examples are local farmers' collectives, collective ownership rights and tribal rights and customs, each of which has its own set of rules, both formal and informal.

Local institutions have three main roles in adapting to climate variability and change, and determining levels of vulnerability. Firstly, they structure impacts and vulnerability. Secondly, they mediate between

**Table 3.1 Illustrative examples of social barriers to adaptation**

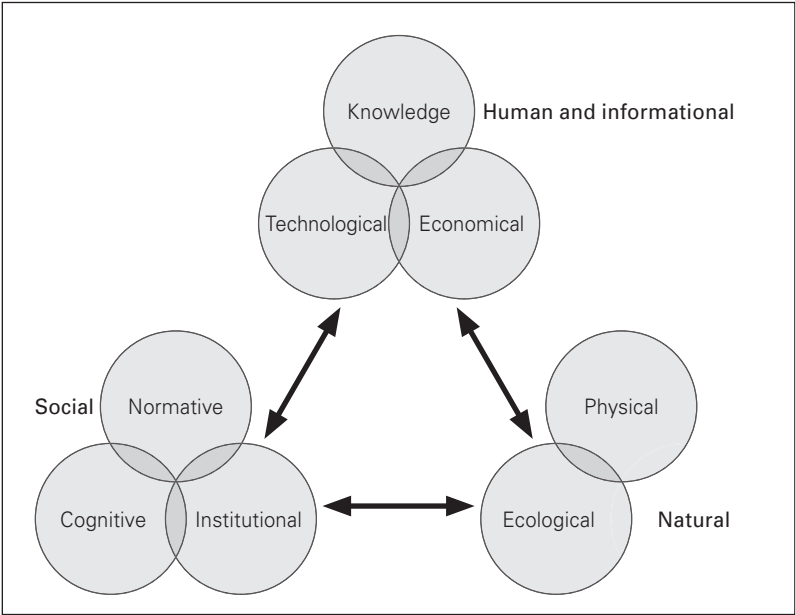
| Social barrier                         | Illustrative examples                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Institutional structure and governance | <ul style="list-style-type: none"> <li>■ Institutional inequities and social discrimination restrict access and entitlement to key resources and assets needed to adapt</li> <li>■ Political and social marginalisation and discrimination</li> <li>■ Lack of institutional flexibility</li> </ul>                                                                                          |
| Cognitive behaviour                    | <ul style="list-style-type: none"> <li>■ Belief that uncertainty is too great to warrant taking adaptation action now</li> <li>■ Lack of acceptance of risks associated with implementing adaptation action</li> <li>■ Change not yet seen as a problem; temptation to wait for the impact to be felt before reacting</li> <li>■ Reluctance to accept outside aid and assistance</li> </ul> |
| Normative behaviour                    | <ul style="list-style-type: none"> <li>■ Sticking to tradition and cultural response actions in relation to climatic stimuli, which may be inappropriate in the context of future environmental change or potentially maladaptive in the longer term</li> <li>■ Unwillingness to deviate from traditional practices and adopt more appropriate and sustainable strategies</li> </ul>        |

Source Jones, L., 2010. *Overcoming social barriers to adaptation*. London: Overseas Development Institute.

individual and collective responses to climate impacts and thereby shape the actions taken to adapt. Thirdly, they act as the primary means of delivery of external resources to facilitate adaptation, and therefore govern access to such resources.<sup>3</sup> For example, institutional characteristics relating to self-determination, participation in decision making, access to financial and technological support and entitlements to education, information and health services all play a large role in either enabling or restricting the actions an individual is permitted to take in responding to shock and stress.<sup>4</sup>

**Cognitive barriers** are concerned with the psychological processes that influence how individuals choose to react in the face of existing or anticipated climate variability or change. People's perceptions and cognitive reactions to threats can range considerably from denial and apathy to helplessness, uncertainty and acceptance. These thought processes – often influenced by local beliefs and customs – can play a large role in determining how people choose to react in the face of climate variability and change. For example, research into extreme weather conditions suggests that women perceive hot and dry summer weather more unfavourably than men, and are therefore more likely to change their behaviour.<sup>5</sup>

**Figure 3.1 Conceptual diagram showing various barriers and limits to adaptation**



Source Jones, L., 2010. *Overcoming social barriers to adaptation*. London: Overseas Development Institute. p.4.

**Normative barriers** are associated with how cultural ‘norms’ influence people’s actions in response to perceived threats to livelihoods. This chapter takes norms to be the ‘dos and don’ts’ involved in particular situations.<sup>6</sup> These shared values and understandings overlap strongly with institutional rules and can be seen in the form of, for example, religious and tribal belief systems; rituals; customs; or restrictions in livelihood practices and dietary options. Although not normally considered concrete barriers, behavioural norms can play a large role in influencing the decisions taken to adapt to climate variability and change.

As one would expect, each of these three features of social barriers overlap strongly with the others. For example, perceptions and cognitive thought process are inevitably influenced strongly by institutional structures, in much the same way that institutional structures are often guided by cultural and traditional behavioural norms. However, each one is distinct in its own right and can play a significant role in either allowing or preventing adaptation action, particularly at local and community levels.

## What are the Implications of Social Barriers for Southern Africa?

Southern Africa's social and cultural context is very diverse. A wide range of different cultures, traditions, customs and rituals are present in the 14 SADC member states. The region is also home to innumerable tribes and ethnic and social groups, some representing small groups of a thousand or so, others consisting of millions of people. This mosaic of social and cultural diversity plays a major role in influencing both collective and individual behaviour. Understanding the processes that govern this behaviour is difficult, particularly as each social institution – be this ethnic rituals, traditional community practices or particular dietary habits – overlap with other institutions and social processes, as well as with an individual's own agency and capacity to act, to form a complicated and multifaceted arena within which decisions are made.

These social processes can be supportive in terms of influencing actions taken to respond to climate variability and change – by providing channels for collective action, for example. However, in some instances they can act as real and challenging obstacles to sustainable and effective adaptation. This becomes even more testing given the strength and influence of many of these social institutions within the SADC region. It is for these reasons that Southern Africa, more than any other region, is facing challenges in overcoming social barriers to adaptation. The following sections explore some of the key social barriers affecting the region, analysing them on the basis of the three types of barriers described above – institutional, cognitive and normative.

### Institutional barriers to adaptation

One of the greatest obstacles to promoting equitable and sustainable adaptation in the context of Southern Africa can be seen in the form of restrictive social structures and institutional environments. Institutions, both formal and informal, are prominent across Southern Africa, and can play a large role in influencing the access and entitlement individuals have to the resources and assets needed to respond to shock and stress. They also have a significant effect on the governance and decision-making processes that determine allocation of these resources.

The impacts of climate change are widespread, but its consequences are disproportionately large for the poorest and most vulnerable communities.<sup>7</sup> Generally, these communities face a host of wider pressures,

some of which may be influenced by the impacts of climate change, including the threat of displacement in conflict, increasing population pressure on land, unequal resource distribution and globalisation. Actions communities take to adapt to climate variability and change will not benefit everyone equally; indeed, some may suffer negative impacts from adaptation actions. With this in mind, the capacity to adapt to climate change will depend largely on underlying structures of vulnerability, such as poverty, inequality and entitlement.<sup>8</sup> However, it is likely that the effects of a changing climate will exacerbate existing inequalities and social structures.<sup>9</sup> Consequently, it is easy to see how restrictive institutions can help create and sustain the parameters of social exclusion and serve as a barrier to enhancing adaptive capacity at community level.

Marginal and excluded groups across Africa provide a useful illustration of how exclusionary institutions and structures can act as a barrier to accessing the resources and entitlements required in times of need. In Kenya, four minority and indigenous communities – the Turkana, Nubian, Endories and Muslims – remain socially excluded through poor access to resources and opportunities, insecure tenure and alienation from the state administration. Indeed, their weak voice in institutional and governance issues ‘restricts their ability to address most of these issues and increases their vulnerability in the face of environmental, economic and political problems’.<sup>10</sup> Many parallels could be drawn with the various minorities across the SADC region: from the Pygmies of the Great Lakes region, to the Himba of Namibia, the San of Southern Africa and the Hadzabe, Maasai and Barabaig of Tanzania.<sup>11</sup>

Institutional structures, such as those associated with tribal, ethnic and religious entities, overlap strongly and can each play a role in determining individual access to assets, capabilities and a voice based on socially defined identities. For example, the institutional environment of a poor woman from a marginalised ethnic group in rural Southern Africa may consist of the various local informal ‘rules of the game’ that apply to women, such as household and family duties; unequal access to education in comparison with males; and inability to participate in village meetings and politics. In addition, it may include institutional restrictions that affect marginalised groups, such as restrictions in employment opportunities and limited access to key resources; those related to religious belief systems, including compliance with rituals, values and beliefs, and abiding by religious structures and behaviours; as well as dietary restrictions. Each of these institutional layers combines to influence, to a large extent, the individual’s behaviour, access

and entitlement to essential resources in times of need. In this regard, it is easy to see how exclusionary behaviours and structures, as well as social stigmas, can limit the adaptive capacities of various marginal groups across Southern Africa, such as widows, orphans, those infected with HIV and the disabled, to name but a few.

To take the gender issue further, many Southern African communities have different roles and responsibilities for men and women, shaped by traditional institutions, rules and behaviours. These features act as gender-specific barriers that limit the ability of women to cope with and adapt to a changing climate. Women, particularly those from poor, rural locations, are typically expected to carry out various prescribed roles and responsibilities. These may include caring for their family's subsistence; fetching and carrying of water for drinking, cooking, hygiene, raising small livestock, and agricultural labour (see Box 3.1).

Moreover, many Southern African societies place an emphasis on women's supportive and reproductive roles, centred on the home and the local community rather than on the public sphere.<sup>12</sup> In the context of drought-affected smallholder communities in Tanzania and Kenya, women's livelihood options are considerably more limited than men's.<sup>13</sup> They are constrained by a lack of access to financial capital and by gendered norms that exclude them from certain economic activities. These factors each serve to limit women's capacities to both respond and adapt to perceived changes in the climate, influencing the effectiveness of household coping patterns. Moreover, people's adaptation strategies can alter household gender relations, mostly to women's disadvantage.<sup>14</sup>

### Box 3.1 Relationship between gender and agriculture

'Women's involvement in an agricultural capacity is most common in regions likely to be most adversely affected by the impacts of climate change, particularly Sub-Saharan Africa and Asia. In these contexts, responsibility for adaptation is likely to fall on their shoulders – including finding alternative ways to feed their family. However, statutory and/or customary laws often restrict women's property and land rights and make it difficult for them to access credit and agricultural extension services, while also reducing their incentive to engage in environmentally sustainable farming practices and make long-term investments in land rehabilitation and soil quality.'

Source Brody, A., Demetriades, J. and Esplen, E., 2008. *Gender and climate change: Mapping the linkages*. Brighton: Institute of Development Studies. p.4.

These institutional constraints can have a significant influence on how women are permitted to react in times of external shock and stress. Incidents of heavier rainfall, greater frequency of droughts and more

seasonality – widely predicted to occur across much of Southern Africa – is likely to increase women's workload, as they devote more time to collecting water and cleaning and maintaining their households. Much of this is time that could be spent in school, earning an income or participating in public life. Walking long distances to fetch water and fuel can expose women and girls to harassment and sexual assault, especially in areas of conflict. There are many accounts of women and girls being attacked when searching for water and kindling in refugee camps around Darfur.<sup>15</sup>

Research suggests that gendered inequalities can be exacerbated in the aftermath of climate-related stress events and disasters. During times of need, and as household workloads increase, cultural institutions often dictate that girls drop out of school to assist with chores and subsistence duties. For example, during the floods of 2000 in southern Mozambique, institutions of patrilineality<sup>16</sup> limited women's control over land and other key assets, particularly in female-headed households, which make up a third of all households.<sup>17</sup> Moreover, relief efforts are managed and controlled almost exclusively by men. Women and their needs, competencies and experiences are often excluded from these efforts.<sup>18</sup> Aside from obvious physical and biological factors, these higher levels of vulnerability are socially constructed and come about largely from social institutions and cultural structures that differentiate the roles, entitlement and empowerment of different social groups.<sup>19</sup>

## Cognitive barriers to adaptation

Cognitive barriers to adaptation relate to how thought processes and perceptions affect adaptation actions. One potential obstacle derives from public understanding of climate change. Citizens of Southern Africa – and Africa as a whole – are among the least informed on issues relating to climate change, its causes and consequences and the actions needed to adapt to it. Research conducted across 11 African countries and drawing on the insights of over 1 000 respondents highlights that in much of the continent many African citizens attribute changes in weather<sup>20</sup> patterns (in part or in full) to God, gods or fate.<sup>21</sup> As a result, there is a strong tendency for Africans to hold themselves individually or collectively responsible and accountable for degradation of the environment and any perceived changes in the weather. The research also points to a substantial role of religious and faith-based readers in informing and catalysing responses to climate change.<sup>22</sup>



This lack of information has serious implications not only for *whom* African citizens hold responsible for current and future changes, but also, inevitably, for *how* people react and adapt to these changes. In general, people who face impacts of a changing climate are far more likely to be able to adapt to shock and stress if they are suitably informed about the issues, are guided in their responses and are motivated to act. Indeed, research from the Africa Climate Change Resilience Alliance (ACCRA)<sup>23</sup> suggests that knowledge and information are core characteristics in promoting adaptive capacity at the local level.<sup>24</sup>

Part of the barrier here lies in the fact that individual responses to a changing climate may indeed be different depending on what people perceive to be its causes. By apportioning blame solely to God, Allah or other religious figures, people's responsive actions may be different from how they otherwise would be if climate change were attributed to different causes.<sup>25</sup> For example, perceptions that variable weather patterns are a result of 'God's will' in punishing people for their sins (see Box 3.2) may lead to responses that try to correct perceived wrongdoings.

Moreover, people and groups within communities have different perceptions of risk relating to climate hazards. Women, for example, tend to perceive greater risk and vulnerability than men when it comes to climate shock and stress events. Similar trends are identifiable among different ethnic and socio-economic groupings.<sup>26</sup> These perceptions and thought processes may also act as an obstacle to accepting the notion that continued changes in the climate – both incremental and sudden – are likely to occur regardless of any internal and personal efforts to

### Box 3.2 Selected interview quotes

'The absence of rain [ ... ] is the work of God and we have no control over it.'

*(Female, Tafelkop, South Africa)*

'The secret is with Allah. Allah brings the rain. The one who causes the drought, who sends us the drought is Allah.'

*(Female pastoralist, Afar, north-east Ethiopia)*

'The changes [in rainfall] is nature, human beings can't cause it. We are in the rainy season so it can rain at anytime. If we are in November/December and it rains then we can say that our sins caused it. We have not sinned enough for God to destroy the world with rain because he has promised not to destroy the earth with rain again but he can use fire.'

*(Female farmer, Rivers State, south-east Nigeria)*

**Sources** Deane, J. et al., 2009. Least responsible, most affected, least informed: Public understanding of climate change in Africa. London: BBC World Service Trust; Neville, L. et al., 2010. *South Africa Talks Climate: The public understanding of climate change*. South Africa: BBC World Service Trust. Available at: <http://africatalksclimate.com/sites/default/files/08-South%20Africa%20Talks%20Climate.pdf>.

appease for ‘sins’, necessitating prompt adaptation actions to prevent increased vulnerability in the long-term and reduce the likelihood of maladaptation. Research suggests that South Africans tend to perceive destruction of the environment as an inevitable consequence of their country’s development, and are therefore more likely to knowingly accept and engage in unsustainable practices.<sup>27</sup>

Another cognitive barrier to adaptation can be seen in the form of self-determination and belief, particularly for marginalised groups. Groups that typically remain excluded from socio-economic and political activities, such as women, marginalised people or tribes and poorer members of the community, may choose to make conscious decisions not to voice their concerns in relation to their direct needs. In South Asia, certain excluded groups are often excluded entirely from decision making, owing largely to restrictive institutional environments and discriminatory perceptions.<sup>28</sup> This can have the cognitive effect of preventing them from seeking the change needed to enhance their adaptive capacities, and of promoting an acceptance that change may not be possible.<sup>29</sup> In some cases, this highlights how economic, political and ideological/cultural institutions can reinforce one another to sustain exclusivity of power within a small ruling elite.<sup>30</sup> Similar comparisons can be drawn in the context of Southern Africa, where institutional restrictions in entitlement and empowerment for various social groups are widespread, particularly at the community level.<sup>31</sup>

## Normative barriers to adaptation

The ways people respond to external stress and hazards, such as drought and heavy rainfall, are shaped to some extent by societal norms and traditional coping strategies. Normative and cultural behaviour, therefore, play a large role in influencing how people respond in the face of anticipated climate variability and change. In many cases, this is a useful asset, in that responses to climate events build on a wealth of traditional and local knowledge, which, in turn, builds on lessons learnt from past experience. However, given that many of the changes projected to occur in a region’s climate may be of a different magnitude or may be unprecedented, persisting with traditional means of coping with climate-related events may no longer be relevant or suitable (see Box 3.3).

Rural farmers in the region, from Tanzania to Swaziland, will each have their own ways of dealing with drought or heavy rainfall episodes, based largely on past experiences and traditional coping mechanisms.

### Box 3.3 Norms influencing adaptation actions

'In 2000, Kenya experienced its worst drought in 40 years. Effects were severe for pastoralists because ancient coping mechanisms had broken down, either because land had been sold or because of barriers erected by the relatively affluent farmers, ranchers, industry, and city residents. Some traditional drought responses, such as raiding of neighbouring cattle and killing wildlife, have become illegal and are no longer an option. As societal norms affect traditional behavior, strategies may no longer be valid and there is the need to support the vulnerable population in identifying new strategies that enable them to deal with adverse climate and adjust to new socioeconomic conditions.'

**Source** UNEP, 2002. *Global Environmental Outlook 3*, UK: Earthscan Publications as cited in Abeygunawardena, P., Vyas, Y. and Knill, P., 2008. *Poverty and Climate Change: Reducing the vulnerability of the poor through adaptation*. Washington, DC: World Bank. Available at: <http://data.iucn.org/dbtw-wpd/edocs/2010-022.pdf>. pp.16.

Research from Bangladesh shows how cultural norms in a number of south Asian nations increase female vulnerability to flooding, resulting in a disproportionate amount of female deaths. Cultural norms prevent women from learning how to swim, as opposed to not being able to swim. In addition, women feel obliged to wear clothing that inhibits swimming and are constrained in their access to emergency warnings and cyclone shelters as a result of cultural norms, substantially increasing their vulnerability in the face of water-related hazards. These social barriers occur not as a result of their femininity, but rather through the institutional and cultural environment that governs acceptable behaviour and entitlement towards women.

**Source** Chowdhury et al., 1993 as cited in Jones, L., 2010. *Overcoming social barriers to adaptation*. London: Overseas Development Institute. p.4.

However, the projected likelihood of shifting seasonal patterns, sharp decreases in winter rainfall – particularly for the extreme south-west of the region – and increases in rainfall intensity<sup>32</sup> make it easy to conceive of a position whereby traditional short-term coping strategies are no longer appropriate. In this scenario, concrete longer-term adaptation measures, and in some cases complete transformations of livelihoods and practices, will be necessary. For example, research in Mozambique shows the livelihoods of the rural poor are increasingly reliant on traditional coping mechanism or reciprocity and exchange.<sup>33</sup> Difficulties and reluctance, as well as a lack of knowledge on how to deviate from traditional coping strategies, can lead to maladaptation, whereby individuals are ultimately made more vulnerable to the impacts of climate variability and change in the longer term.

Transcending traditional norms and behaviours is not something that happens easily or quickly. These characteristics can act as a considerable barrier to adaptation, even when adaptation actions are clearly identifiable and logical. An example from India is helpful in highlighting this. In Assam, certain groups are unwilling to use flood-tolerant methods of house design – houses supported on stilts made from wood and bamboo

– even though this has proven to help avoid the impacts of floods, simply because these houses are typically associated with poorer fishing communities and they do not want to be associated with the lower castes.<sup>34</sup> However, it is important to remember that social norms and behaviours can be overcome, however reluctant people may be. Gradual shifts in attitude may arise out of the fact that fewer response options exist, out of efforts to promote cultural change or out of generational differences. Returning to the example of India, it has been observed that ‘to deal with climate-related changes and stress, people in Assam have had to take on new occupations and livelihood options previously considered socially unacceptable, such as trading, selling fish, and liquor production’.<sup>35</sup> This shows that, although norms act as veritable *barriers* to adaptation, they rarely act as *limits* to adaptation, and are indeed surmountable.

## How Can Adaptation Policy Making Help Overcome Social Barriers?

The insights above point to the strong influence of social and cultural factors on adaptation actions at the local level. As we have seen, however, few of these characteristics act as definite limits to adaptation, in the sense of being insurmountable. Indeed, many of them have the potential to be overcome through effective and well-thought-through actions by social agents, civil society and policy makers. Nevertheless, simple recognition of social barriers will do little to bring them down: it is important to take proactive steps to address them effectively. In the following sections we identify a number of concrete steps, relevant to the Southern African context that can help overcome these barriers to adaptation.

### Education, communication and engagement

An obvious starting point in addressing social barriers is the promotion of education and awareness. This can take many forms and relates not only to communicating the causes and impacts of climate variability and change, but also to informing and educating people on the need to ensure sustainable adaptation and with it, specific guidance on the most appropriate forms of adaptation action. Such initiatives will look to address many of the cognitive and normative barriers, particularly in an attempt to motivate effective and appropriate adaptation actions.

With this in mind, information on the type of adaptation action communicated is essential, as ill-informed or ill-considered

recommendations can lead to maladaptive practices and increased vulnerability in the longer term. In this regard, adaptation will not be the same for everybody: small-scale subsistence farmers will have to adapt in different ways to larger-scale industrial farmers, in much the same way that rural communities will have to plan their adaptation action and policies differently from those in urban and peri-urban localities. In addition, it is important to recognise that communication may have a number of different means, and fulfil several different functions (see Box 3.4). Therefore, it is vital to give thought to both *how* relevant information is communicated and *who* is targeted and likely to receive it.

### Box 3.4 Types of communication in support of adaptation

- Educational communication is about sharing proven know-how, including support [for] training and technology transfer. The trend is to move from simply delivering the message to engaging the users in applying the information.
- Policy communication informs on policies and laws. This typically involves mass media and campaign formats, but further audience engagement is necessary when significant changes in policy take place.
- Participatory communication can help stakeholders come together, innovate and negotiate. Interactive group media are most often used to support such exchanges.
- Organisational communication improves coordination among and within groups and agencies.
- Advocacy communication helps people lobby for changes in policies and programmes. Very often, this function is implemented through a combination of campaigns and face-to-face interaction.
- Conflict management communication uses methods and media to encourage negotiation and to mediate conflicts. Video has been used successfully to allow each party to explain their interests, with the other side then able to view the recording. This is a form of structured listening.
- Risk communication informs people about hazards and supports people's participation in decision making on risk management, as well as encouraging behaviour change that will enhance mitigation.

Source Acunzo, M. and Protz, M., 2010. *Collaborative Change: A communication framework for climate change adaptation and food security*. Rome, Italy: Communication for Sustainable Development Initiative (CSDI). Available at: <http://www.fao.org/docrep/012/i1533e/i1533e00.pdf>. p.28.

Particularly important in the Southern African perspective is the need to ensure effective engagement in communicating climate change issues at the local level. This is crucial to guaranteeing acceptance and take-up. Notably, there is a lack of understanding about climate change terminology, particularly within certain Southern African languages, which can prevent public engagement. Appropriate words are not accessible for many Southern Africans and are often used interchangeably with other terms,

and this can inhibit discussion of the issue in greater depth and clarity. For example, opinion leaders in South Africa point to the lack of appropriate vocabulary as a factor that prevents engagement and increases the perception that climate change is not immediately relevant to people's realities.<sup>36</sup>

Examples of this can be seen in the different interpretations of 'weather' and 'climate' (see Box 3.5), and confusion surrounding understandings of the processes of 'global warming' (often inaccurately conflated with the ozone layer, tectonic movements and earthquakes or other largely unrelated issues). Indeed, research suggests that an important repercussion of miscommunication is that 'a problem that will affect Africa more than any other continent is being framed in language and terms that are largely divorced from African reality'.<sup>37</sup> It is not only words that are important, but also recognising the cultural heritage and rich diversity of stories and myths that exist across Southern Africa. Although the scientific basis behind many of these stories may not be clear, working with and incorporating cultural beliefs into communication strategies can be used as a means of engaging communities more effectively in important issues and to spur on behavioural change.

### Box 3.5 The importance of communicating climate change effectively

'We don't have a term to describe climate change in our language. We have many words for particular weather conditions – such as wind – but it takes us at least four times as long to describe an issue of climate as it would in English [ ... ] it means it can be quite boring for the listener.'

(Claudie Tsheya Ikela, general manager, TV Programmes, Namibian Broadcasting Corporation)

'Climate change is an esoteric and initially confusing concept to many. Communication about it must use a community's own language and terms they can understand.'

(Saleemul Huq, senior researcher, International Institute for Environment and Development)

Source Deane, J. et al., 2009. *Least responsible, most affected, least informed: Public understanding of climate change in Africa*. London: BBC World Service Trust.

Consequently, well-thought-through engagements for communicating climate change issues may be one of the most important components of adaptation policy. Crucial in attempts to connect and relate to the contexts of people at the local level are considerable efforts to contextualise climate-related information. Given that local authorities, ethnic and tribal chiefs and religious leaders have a strong influence on institutional, normative and cognitive behaviour within communities across Southern Africa, the scope for including them in decision making and communication strategies is enormous. In this regard, the communication of climate-related

issues can and should extend beyond written mediums, with practitioners exploring the use of theatre and art, and more modern means such as audio and visual methods.<sup>38</sup> For example, experiences of using local theatre to promote social change on HIV/AIDS and health issues, environmental awareness and gender empowerment are well documented in Southern Africa,<sup>39</sup> and demonstrate the effectiveness of this medium and its take-up.

The impetus for awareness and change must come from within the region and not from outside. Effective delivery and uptake is likely to be far more successful if communication and engagement are driven directly by the agendas and needs of Southern African communities themselves. In this regard, African policy makers and agents of social change can look to South Asia, Nepal in particular, where rapid outreach and engagement on climate change-related issues have been relatively successful in raising public awareness over the past few years. In part, this has been achieved through active translation into local languages, as well as dissemination and awareness in public schools, libraries and government agencies, with a focus on public participation in and ownership of environmental protection activities. A multifaceted and bottom-up approach promoting the role of local communities, non-governmental organisations and both private and public agencies will contribute greatly to raising awareness of climate-related issues and, most importantly, generate the motivation needed to stimulate action and cognitive, institutional and behavioural change.

## **Addressing the underlying drivers of vulnerability**

As noted above, unequal and restrictive institutional structures can severely limit entitlement to the key resources needed to respond and adapt to climate-related threats. This is particularly the case for marginalised members of the community. These social and cultural factors are related largely to the underlying drivers of vulnerability and can determine, to a great extent, an individual's or group's adaptive capacity. Institutions and structures associated with land rights within customary land-tenure systems, ethnic and tribal kinship, and gender-related roles, rights and inequalities are prime examples of social characteristics that will inevitably have an influence on adaptation actions at the local level.

It is here that the role of wider development interventions can be significant. Many development interventions, such as those aimed at addressing disaster risk reduction, social protection and sustainable livelihoods, can be crucial in addressing restrictive institutions and structures. Development efforts that seek to reduce levels of absolute and relative

poverty, to empower marginalised members of the community and to support greater access to resources and entitlement by the most vulnerable can contribute significantly to efforts to address many of the cognitive, normative and institutional barriers to adaptation – even if they do not specifically have a climate change programmatic focus. Moreover, these development approaches are themselves affected by many of the same social barriers. Rather than attempting to follow each approach in isolation, there is a need to recognise the complementarities in how different approaches tackle these barriers, so as to move towards the common goal of helping to overcome the underlying drivers of vulnerability.

In this, it is important to consider the strong overlap between adaptation and ‘traditional development’ practice. Indeed, a wide spectrum of interventions can be considered as ‘adaptation’, from those concerned primarily with addressing the impacts of climate change to those associated with the underlying causes of vulnerability,<sup>40</sup> as many of the latter contribute to adaptive capacity and complement adaptation, falling well within the wider spectrum of adaptation projects.<sup>41</sup> With this in mind, policy makers need to ensure that efforts, planning and finance to support adaptation are not skewed towards the more highly visible ‘impacts’ end of the spectrum, but also support the ‘vulnerability’ end – with attention to the underlying drivers, and not merely those associated with climate change. Failure to make investments in these ‘soft’ measures will leave gaps in the landscape of adaptation efforts, and may risk seeing the issue of social barriers affecting the sustainability and effectiveness of adaptation planning, especially for the marginalised and most vulnerable members of communities in Southern Africa.

## **Mainstreaming and informing adaptation planning at national and local levels**

Adaptation planning within the SADC region needs to give recognition to the role that social barriers can play in limiting the success of planned interventions. Therefore, it is vital to mainstream thinking around social barriers within wider adaptation policy frameworks, such as the work arising out of the seven national adaptation programmes of action (NAPAs) submitted to date within the SADC region and the single pilot project for climate resilience (PPCR).<sup>42</sup> Similarly, national and regional road maps and response strategies need to give recognition to the role of social and cultural characteristics in influencing adaptation action, and generate policy to respond accordingly. For example, although partial mention of



certain elements are given within South Africa's National Climate Change Response Strategy and its Framework for Sustainable Development, neither gives sufficient attention to the role of cognitive, normative and institutional barriers to adaptation, nor are there suitable policy responses.

Going one step further, initiatives to address these barriers should be incorporated into practical, structural and most importantly, output levels of policy interventions, rather than simply giving mention to social barriers within the various frameworks. In the case of Nepal, initiatives are under-way to prepare a parallel *local* adaptation programme of action. This aims to address adaptive interventions at the sub-district and community levels, looking to assess, inform and adapt specific cultural and institutional environments through the development of local programmes of action. This seems a novel way to deal with adaptive interventions at local level, and has the potential to be applied in the Southern African context.

Indeed, actions need to be taken at scales below national and regional states, right down to the community level. Although much of the focus is on planned adaptation, adaptive behaviour at the local level will mostly occur autonomously, that is, responses that take place without the direct intervention of a public agency. Given that autonomous actions are directed largely by existing cognitive, normative and institutional structures, efforts need to be made to facilitate informed and sustainable local adaptation. One example is community-based adaptation (CBA), which has gradually gained prominence across much of Africa. Tailored towards local cultures and conditions, CBA supports and develops informed autonomous adaptation to climate variability and change, involving both local stakeholders and development and disaster risk-reduction practitioners. As such, CBA builds on existing appropriate cultural norms while addressing local development issues that help alleviate vulnerability, making use of efforts to contextualise initiatives within the broader cultural environment.<sup>43</sup> Although CBA initiatives need to be wary of the influence of restrictive local institutions and structures, they are a useful starting point in trying to work towards addressing key social barriers in an inclusive, participatory manner.

## Conclusion and Policy Considerations

Although there are a number of policy options that can enhance the adaptive capacity of people who are vulnerable to the harmful impacts of climate variability and change, attempts to enforce social and cultural change carry with them many complex and sensitive ethical concerns.

Indeed, although social and cultural transformation may have tangible benefits, demanding that other cultures change and deviate from long-standing cognitive, normative and institutional practices is a sensitive issue and presents a major challenge, particularly given Southern Africa's rich social and cultural environment. However, if interventions are carried out in a way that complements and respects the social and cultural environment of the local context, they can help address the substantive obstacles that social barriers present. Although cultural norms and institutions are largely responsible for the creation of these barriers and restrictions, particularly at the local level, it is important to note that effective and equitable adaptation will occur only if these restrictions are recognised, influenced and overcome.

Policy makers within the SADC member states face a number of challenges for adaptation planning, as social barriers pose real obstacles to the success and sustainability of adaptation policy across the region. However, a number of policy options exist in trying to overcome these cognitive, normative and institutional barriers. At the heart of this, efforts to promote greater education, communication and empowerment are central to policy success. Moreover, there is an imperative to address underlying drivers of vulnerability and to ensure that social characteristics are mainstreamed into adaptation planning at all scales in order to facilitate sustainable adaptation and prevent maladaptation. Addressing the 'soft' approaches along the adaptation continuum may not be as visible, nor are the results easily measurable. Nevertheless, strong leadership from policy makers at all levels is needed in this area to help the Southern African region respond to and address the social barriers to adaptation it currently faces.

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# 4

## Social and cultural barriers to adaptation implementation

### The case of South Africa

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#### Introduction

Anthropogenic climate change has risen to the forefront of political agendas and is now widely recognised as the most formidable and complex challenge that humanity has faced.<sup>1</sup> The adverse effects of climate change are disproportionately distributed; groups who are already vulnerable and marginalised are often the most affected. The Intergovernmental Panel on Climate Change (IPCC)<sup>2</sup> lists Africa as the continent most vulnerable to climate change. Such acute vulnerability is largely attributable to pervasive multiple interacting stressors, such as widespread poverty and high disease burdens which are likely to be exacerbated by adverse climate change impacts.

Although much attention has been focused on climate change mitigation, there has been comparatively little research conducted on adaptation, particularly from a social and cultural perspective. The potential social and cultural barriers and opportunities to adaptation need to be integrated into policy decisions on climate change. Mdluli and Vogel<sup>3</sup> explain that it is critical to examine the 'soft' measures (i.e. social and cultural), as well as the hard (i.e. technical) measures that are required to ensure improved adaptation to support both natural and human systems in the face of climate change.

This chapter emphasises the central role of social and cultural factors in influencing the implementation of adaptation measures, with a specific

focus on the South African context. It explores, from a social and cultural perspective, both the barriers and opportunities to developing so-called climate change citizenship. Citizenship includes rights and entitlements, as well as duties and responsibilities, and therefore bridges the actions required for both the mitigation of, and adaptation to, climate change. The shift towards climate change citizenship requires that governments, civil society, non-governmental organisations and individuals take into consideration the social and cultural factors that shape both individual and societal responses to climate change. This research draws on the extensive body of literature that has been produced over the past few years on climate change, as well as primary research conducted in eThekweni and Ugu Municipalities in KwaZulu-Natal, and in Cape Town. Although the analysis draws mainly from the South African context, the key findings and arguments presented are broadly applicable to the Southern African Development Community (SADC).

This chapter first presents a conceptual framework that guides the analysis of the social and cultural barriers to climate change before considering the role of SADC, and the particular case of South Africa, in addressing this issue. It then focuses on the main factors that underpin social and cultural barriers and opportunities to climate change, using case studies to illustrate the impact of social and cultural conditions on adaptation.

## **Political Ecology and Cultural Frames: A Conceptual Framework**

The impact and severity of climate change events, both acute and chronic, are not determined solely by the nature of the physical event. The underlying social, economic and political conditions in an area affected by climate change are just as important as the event itself.<sup>4</sup> The theory of political ecology provides a useful framework for understanding how social, economic and political factors make people more vulnerable to climate change and limit their responses, thereby turning climate change events into disasters and shifting adaptation to maladaptation.<sup>5</sup>

Political ecology allows for multi-scalar analyses, from the individual to the global scale, of economic, social and cultural influences on climate change adaptation and mitigation, including the influence of different knowledge systems and discourses on climate change agendas and management, rather than technocratic, deterministic analyses and solutions. Therefore, political ecology attempts to link structure,

agency and the biophysical environment. This is a complex task in reality, but it is viewed as crucial for gaining an inclusive understanding of the dynamic forces influencing climate change adaptation measures and revealing social and cultural barriers to adaptation.

Culture is also a main social characteristic that influences how and why individuals and groups engage with climate change impacts. Culture has myriad spatial, physical, visual and emotional expressions. Moreover, culture is fluid; it is open to various influences; and it exists and changes at different scales. Tiwari cogently argues that 'all cultures are living cultures' and 'one needs to see culture as a continuum from the past to the present, and its transformation into some new form in the future is to be taken as a natural process'.<sup>6</sup> Therefore, as processes, cultures are likely to transform and take on new forms in the future, increasingly shaped by the need to build resilience and adapt to the effects of climate change.

Notions of culture, however, are deeply complex and contested, and there is no universal definition of culture. This analysis assumes the following definition: '[C]ulture comprises the material products, patterns of social relations, and structures of feelings produced by multiple actors, who are differentially positioned in power relations, political economies, and social reproduction'.<sup>7</sup> Understanding culture in this way recognises the contested nature of culture and its attributes, co-produced in dynamic ways by different actors within and between generations.<sup>8</sup>

Interpretations and responses to climate change are rooted in social processes and cultural interests.<sup>9</sup> It is, therefore, crucial to understand the role that cultural and social attributes play in shaping understandings, responses and attitudes to climate change, which have implications for adaptation possibilities. Despite previously being undervalued in many climate change studies, perhaps because of its sensitive nature, difficulties in defining culture and the challenge of relating cultural influences to risk and vulnerability, culture is increasingly recognised as a key characteristic influencing climate change adaptation.<sup>10</sup> Heyd argues that the conceptual framing of environmental phenomena and the development of citizen-led participatory governance are two key areas in which cultural dimensions play a central role in approaching climate change. Culture is, therefore, critical in constructing and supporting 'climate change citizenship'.<sup>11</sup>

Cultural frameworks comprise an 'ensemble of beliefs, values, priorities, practices, and material support that characterise particular patterns of human thought, attitudes and behavior'.<sup>12</sup> The pervasive and

historically entrenched belief that culture can be separated from, and analysed as if it were independent of other human dimensions of climate change, and from nature more broadly, is a potentially disabling cultural construction.<sup>13</sup> The supposed nature/culture divide has considerable implications for sustainable development, vulnerability and adaptation to climate change.<sup>14</sup> Increased awareness of the interdependency between nature and culture, or human and non-human systems, is urgently required for adaptation measures to succeed. It follows, therefore, that cultural frameworks should be incorporated into environmental decision-making processes (including climate change mitigation and adaptation), and it is this approach that this chapter adopts.<sup>15</sup>

## **SADC and South Africa: State Institutions as a Cultural Resource**

Since climate change impacts are manifested at multiple scales and straddle national borders, SADC has a key role to play in facilitating national efforts and joint climate change initiatives. SADC has recently begun to address the phenomenon meaningfully through the development of policy documents.<sup>16</sup> However, translating such policies into practice faces numerous challenges, such as resources, political will and priority at regional level, as well as linking multiple scales of action. SADC needs to play a key role in encouraging all scales of government and society to account for the social and cultural constraints and opportunities within institutions and at grass-roots levels that both developmental and adaptation measures are likely to encounter. Given its regional orientation, SADC is most likely to engage with and influence national governments as an initial strategy and entry point rather than lower government and grass-roots levels.

The South African government can be considered as one of the leading states in the SADC region regarding efforts to address climate change, through, for example, the introduction of the National Climate Change Response Green Paper (2010). Climate change policies in South Africa, however, are likely to face significant implementation challenges in what is already a socio-economically and environmentally stressed context.<sup>17</sup> Although South African national and local governments have made significant progress in developing a comprehensive climate change road map, it is at the local community level that many adaptation initiatives will have to be implemented. It is, therefore, important to understand the challenges and opportunities for adaptation at these



finer scales and account for them in the development and implementation of such policies.

According to Heyd and Brooks, decentralised and participatory approaches to governance are cultural resources that can assist in climate change adaptation.<sup>18</sup> The South African context, characterised by legislated cooperative and decentralised governance approaches, is therefore well placed to take advantage of this cultural resource. Nevertheless, certain cultural preconditions and considerations are required. Existing institutional cultures need to be open to transformation, and institutions at all levels need to be adaptive and flexible to cope with the unprecedented challenges posed by climate change, and social and cultural responses to it.

## **Adapting to Climate Change in South Africa: Social and Cultural Barriers and Opportunities**

There are a number of social factors and cultural influences that underpin and shape people's responses to climate change.<sup>19</sup> It is important to analyse these interdependent factors within the local context so as to develop socially and culturally informed adaptation measures. The eThekweni municipality and the City of Cape Town are viewed as leaders in the developing world context with regard to their progressive and anticipatory climate change adaptation strategies and actions.<sup>20</sup> Conversely, Ugu district, a rural municipality, has not to date initiated any specific adaptation strategies. It has adopted a more reactive approach and has tended to focus on co-benefits of existing initiatives and legislative compliance.<sup>21</sup> Nevertheless, there are concerted attempts to incorporate climate change concerns into decision making, as well as to create broader awareness within the municipality and in local communities through a number of educational initiatives.<sup>22</sup>

The research conducted for this chapter between 2009 and 2011 focused on both rural and urban areas that reflect different socio-economic, cultural and environmental contexts.<sup>23</sup> Research methods included in-depth interviews with household representatives, government officials and representatives from other key institutions, such as non-governmental organisations (NGOs) and environmental consultancies; household surveys and focus groups were also conducted. The research provides insight into specific social and cultural enablers and constraints to adaptation at the grass-roots level, which are often overlooked yet require urgent incorporation into related decision-making

processes and policies at all levels. The analysis is grouped into different themes, which are interconnected, under the categories of social and cultural influences.

### **Trade-offs:**

#### **'Environment versus development' and environmental scepticism**

The problematic 'environment versus development' discourse, a myth that has long characterised response to environmental concerns in South Africa, continues to shape responses to climate change. The nature/society divide as well as racial and cultural tensions surrounding environmental protection have exacerbated binary thinking regarding development and environment issues in the South African context.<sup>24</sup> Historically, African communities suffered major land and livelihood losses in the name of 'nature conservation' imposed by colonialists and the apartheid government.<sup>25</sup> This injustice remains firmly entrenched in cultural memories and presents a possible formidable barrier to climate change adaptation, as poor and marginalised people often consider environmental protection to be about conserving nature for the benefit of the privileged few.

According to an Ugu municipal official:

I can tell you, from government and from local people's demands, development comes first! The environment is either a nature conservation issue or it is a development impediment mechanism. That we must plan and develop with the environment in mind is not a well-known issue.<sup>26</sup>

In South Africa the pro-growth and pro-poor agenda has focused on maximising the value of economic, environmental and social resources within a neo-liberal approach. This approach polarises environment and development issues, with this binary thinking persisting at all levels of government.<sup>27</sup> As Patel explains, 'sustainable development is still regarded as a trade-off between environment and economic development priorities in South Africa in some powerful quarters'.<sup>28</sup> In the SADC region and South Africa, development is focused on meeting basic needs and addressing poverty. In this context environmental concerns are often viewed as a luxury and in conflict with much needed development priorities.<sup>29</sup>

A widespread reconceptualisation of the environment and development agendas as being inextricably linked needs to be facilitated through, for example, climate change adaptation measures that do not inadvertently create further injustices and undermine livelihood opportunities for the already poor and marginalised.<sup>30</sup> This argument links to increasing calls for mainstreaming or embedding climate change mitigation and adaptation into existing development and governance regimes, particularly in the so-called ‘developing world’, which is characterised by pressing development goals.<sup>31</sup> However, in order for mainstreaming to be successful, decision makers and politicians need to begin to understand climate change as an issue that fundamentally affects, and is intertwined with, development.<sup>32</sup>

Environmental scepticism is entrenched in the divide that has been created between environment and development. Mistrust of science by well-informed, networked citizens and those that have been marginalised from and by science challenges the positions adopted by scientists about environmental issues. In terms of climate change, global science models remain broad and varied, and this creates the space for cynics to question the predictions related to changes in the earth’s climatic system. These sceptics undermine adaptation measures. Different knowledge systems and cultural beliefs also challenge mainstream science’s arguments about climate change (see Section 4.4.6). As a result, people believe that they do not need to worry about predictions made by scientists that may happen or may not be true. They, therefore, adopt a reactive rather than proactive approach to risk.

## Political will and social barriers

Champions who passionately argue for a change in thinking and action can break down the kinds of divisions discussed in the section above. Political will and leadership become important in reorientating society at all levels towards climate change adaptation and climate change citizenship. Despite the recent emergence of a few key climate change champions,<sup>33</sup> several municipal and institutional representatives from both Ugu and eThekweni municipalities raised concerns about inadequate political support for furthering adaptation agendas. As one representative in Leck’s study claimed, ‘politicians have never really bought into this idea of environmental care and now climate change, it is all lip service really, they don’t recognise the huge role that the environment plays in the wellbeing of their people’.<sup>34</sup>

Although such claims are somewhat of a generalisation, increased climate change education, with a particular emphasis on the substantial synergies between adaptation and development, is evidently required at all levels of government to facilitate much needed political support.

In addition to politicians, traditional leaders are vital actors within the South African cooperative governance system. Such leaders (known as *Nkosis*, or chiefs/rulers) retain a strong influence over African communities, particularly those in rural areas. Communities are more likely to accept climate change information and proposed strategies from traditional leaders with shared cultural beliefs and values than from outsiders. As an Ugu municipal official explained:

[W]e need to start with community groups, ward councillors, nkosis ... people listen to them better, we need to inform these guys of these issues so that they can communicate, they are the ambassadors, the ones that the community trusts. So it means that if we communicate climate change issues with them they will go around and communicate and the word will spread.<sup>35</sup>

Traditional leaders need to be involved in adaptation decision making processes from the outset if adaptation measures are to be accepted and successfully implemented in the areas that they preside over.

## **Institutional dynamics and social barriers**

Institutional dynamics and the actions of government bodies at all levels create the conditions within which local grass-roots actors experience and respond to climate variability and change. Adaptation to climate change is multidimensional and multi-scalar, encompassing a large number of actors, sectors and governance levels across various scales of action. Since adaptation does not occur within an institutional vacuum, institutional social and cultural dynamics at various levels need to be considered in conjunction with grass-roots-level considerations for adaptation to climate change.<sup>36</sup> Relations between all government tiers need to be strengthened. For example, local governments are well placed to acquire understandings of grass-roots-level social and cultural influences on adaptation measures, which in turn, need to be communicated to higher tiers of government to be incorporated into decision making and policy making.

Moreover, horizontal linkages between municipalities such as eThekweni and the bordering Ugu municipality (urban-rural), as well as linkages between municipal bodies and local NGOs and other institutions, need to be enhanced to facilitate information-sharing in interconnected contexts.<sup>37</sup> There are, however, formidable barriers to cooperative governance, including a lack of national and provincial support mechanisms to facilitate collaborative local governance. At the already overstretched local municipal level, such as Ugu and eThekweni, the research revealed that collaboration is hampered by many constraining factors, including, *inter alia*, institutional and resource constraints, lack of support from politicians and conflicting priorities. The divisions between departments within each tier of government, which is known as the 'silo effect', also impacts on the ability of the state to shape climate change responses. There needs to be a united campaign by national, provincial and local government to create a consistent body of information and branding so that all messages that go out to the public are related and coordinated. This campaign needs to be conceptualised as long-term, as this approach will build trust.

Existing institutional cultures need to be open to transformation, and institutions at all levels need to be adaptive and flexible to cope with the unprecedented challenges posed by climate change. Aylett, however, cautions that established institutional cultures and patterns can be highly resistant to change.<sup>38</sup> Despite this, Ugu, eThekweni and the City of Cape Town municipalities appear to be progressing in overcoming traditionally conservative organisational cultures within certain departments that are innovatively approaching climate change issues. For example, both municipalities have developed Municipal Adaptation Plans (MAPs), which have encouraged greater inter-departmental collaboration.<sup>39</sup>

A further requirement is meaningful involvement and influence of grass-roots actors in influencing decision makers to facilitate innovative and contextually appropriate climate change policy making that considers social and cultural influences. Although still in its infancy, eThekweni Municipality has initiated a Durban Climate Change Partnership that aims to bring together large numbers of stakeholders in a coordinated manner to address adaptation and mitigation issues.<sup>40</sup> The partnership presents an opportunity for grass-roots actors, NGO representatives, government officials and other organisations to deliberate and jointly account for social and cultural influences on adaptation measures.

Additionally, eThekweni has initiated a Climate Smart Communities pilot project that focuses on community-based adaptation and includes social assessments of the suitability of replacement crops necessitated by anticipated declines in maize yields.<sup>41</sup> This shows further evidence of eThekweni's initiative in engaging with community efforts to adapt to climate change. Despite these significant advances, considerable barriers to institutional transformation as well as collaborative, networked governance continue to pervade South Africa. Such barriers hamper meaningful consideration of different social and cultural influences on adaptation measures, both at grass-roots levels and within government institutions.

### **Whose responsibility is it?**

#### **Governmentality and the individualisation of the problem**

Section 4.3 highlighted the importance of institutional transformation at a state level for the inclusion of social and cultural dimensions into climate change adaptation. Both the literature and case study data reveals that the state has begun to engage in a new process that distances it from the day-to-day responsibility of dealing with the issue. Although state institutions at a strategic level raise concerns about climate change, they tend to pass the responsibility of adaptation down to the level of the individual.

The most recent trend in contemporary neo-liberal society is a focus on the individualisation of environmental responsibility.<sup>42</sup> Since the early 2000s, there has been a plethora of projects aimed at encouraging individuals to contribute to and participate in efforts to limit climate change.<sup>43</sup> This process of individualisation is considered to be problematic because it diverts attention from the real origin of greenhouse gas emissions and the state's responsibility to regulate them. Paterson and Strippel maintain that the impact of individual actions in the face of the powerful structures of state and capital is negligible.<sup>44</sup> Responsibilities are being shifted from the state to individuals, and governments are increasingly using 'technologies of rule' to induce people to carry out the state's mandates.<sup>45</sup> In this way, green subjectivities are created in which individuals, in their homes and everyday lives, are increasingly pressurised to assume green behaviour. Paterson and Strippel echo this critique that the displacement of the state's responsibilities onto the individual is a diversion of attention from the 'broader political questions of power and collective responsibility'.<sup>46</sup>

Through state policies individuals are made to feel responsible for mitigation and adaptation, and they attempt to change their behaviour in those areas that they can influence. However, they feel powerless to change the larger systems within which they operate, such as being able to shift from private transport to safe, efficient public transport. They may become disillusioned as they shift to low-energy lifestyles in their homes while having no control over the bigger systems that impact on their broader energy consumption. This is evident in South Africa where, for example, individual citizens were given the responsibility by municipalities for cutting household energy consumption by 10 per cent as a result of Eskom's energy crisis in 2009, while they could not influence broader energy use and decision making in the country.

The proposed Coastal Protection Zone by-law introduced in the City of Cape Town to restrict development in the coastal zone, positions the city as a champion and leader in adaptation to climate change. The Environmental Resource Management Department has taken radical steps to ensure that coastal areas are protected and the risk and costs of rising sea level and storm impacts are reduced. However, the proposed setback lines, which will limit development in the coastal zone, have been challenged through political and legal debate at all levels of government, and hence are still under negotiation in the city. When municipalities lead in this way to directly address climate change impacts then ordinary citizens tend to see their own contribution to the problem as more meaningful.

This mainstream approach to adaptive climate change citizenship is based on the behavioural approach, in which a climate change citizen is someone who has been persuaded to modify his/her behaviour voluntarily to be more responsive to climate change causes and threats. Two important assumptions of this model are that people have endless motivation to alter their behaviour in terms of what is considered optimal behaviour, and that knowledge generated through the internalisation of information is linked to action. This is evident in one of the main challenges to climate change governance, whereby people on the surface accept that climate change is real, but do not internalise this threat in any significant way. They do not believe at a deeper level that the changes caused by climate change will become a reality. Therefore, there is a disjuncture between thought and fact, which would lead to action.

Rowley and Phillips suggest that the current framing of the environment is incorrect, as citizens adopt the position of protecting the environment as if it is external to themselves. This perception does

not reflect that environmental risk and impacts are embedded in and caused by human activities and behaviour, and hence are not external to human life and behaviour.<sup>47</sup> The term ‘smart living’ is a more user-friendly expression for encouraging individuals to practise low-carbon lifestyles, and emphasises that people are part of the environment. The City of Cape Town has produced a *Smart living handbook* for the public, schools, industry and business, which guides people on how to be sustainable and resource-efficient in their daily lives and practices. It provides practical information on how households can protect the environment, save money and create safer and more sustainable homes.<sup>48</sup> A low-carbon lifestyle, which is a form of adaptation, would thus be a smart way of living.

### Awareness raising and education

Government policy discourses that raise awareness for the public and provide information about the need to respond to climate change are mostly based on the rationalist ‘information deficit model’. This is a model of the relationship between the public and government wherein ‘the need to “inform” the public [is] implicitly premised on public ignorance’.<sup>49</sup> The model assumes that people will understand the relationship between policy issues and the science that underpins them, and then act accordingly. However, the public often cannot easily access the science behind policy and hence do not act in accordance with what is proposed.<sup>50</sup>

The relationship between knowledge and action is not readily seen in practice. Smith and Pangsapa point out that rather than using environmental knowledge to change behaviour, people take it in and reproduce this received knowledge in their own everyday discourses.<sup>51</sup> Education *about* climate change tends to focus on what people need to do (i.e. a behavioural approach) to reduce their impacts on the environment, such as reducing energy use. What is needed is education *for* climate change, whereby citizens understand how their daily lives are embedded in and connected with both climate change mitigation and adaptation, given that the impacts of climate change are a reality.

Raising awareness about climate change and education for adaptation is critical at all levels – from politicians who need to support the shift towards adaptation, to individuals who are trying to change their lifestyles or survive the impacts of climate change. Grass-roots or community-level research in KwaZulu-Natal revealed that perceptions



and experiences of climate variability and change varied across age, cultural and race groups, gender and, crucially, between communities in rural and urban areas.<sup>52</sup> Generally, there is a relatively high level of awareness of climate change within the study sites. However, there is widespread misunderstanding about the causes and likely impacts of climate change. For example, interviewees commonly confuse climate change with global warming and the depletion of the ozone layer, and often understand weather and climate change as being interchangeable. The types of materials that are produced to raise awareness and educate people about climate change do not always address the living environments of all South Africans. Government brochures often address adaptation related to 'formal' households that have access to services and domestic technology. There is very little produced on how households in informal settlements or rural areas can adapt to climate change.<sup>53</sup>

Moreover, education levels emerge as a key determinant of the depth of climate change understanding. Without knowledge about projected changes in climate and their likely adverse impacts, individuals' ability to make anticipatory adaptations, as well as community support for adaptation measures, will be undermined.<sup>54</sup> Importantly, transmission of information needs to be sensitive to interlinked social and cultural influences. For instance, the term 'climate change' has created confusion among isiZulu-speaking people and is widely noted as a 'white people's' term, as there is no direct translation in the isiZulu language, and the terms 'weather' and 'climate' are used interchangeably.<sup>55</sup> This terminology confusion has emerged as a possible barrier to adaptation in the broader municipal context.<sup>56</sup>

Many actors in both rural and urban communities emphasised the need for education and awareness raising, and showed an eagerness to learn more about climate change.<sup>57</sup> Both the Ugu and eThekweni municipalities recognise the need for community education. eThekweni has been a catalyst in implementing eco-school projects and Ugu municipality is encouraging environmental awareness campaigns in local schools. Despite these efforts, climate change education, particularly for poorer, rural communities, is evidently not a government priority as yet and urgently needs to be initiated on a greater scale. A sustainable-schools project revealed the power of primary-school education in creating awareness of climate change. Primary-school children are powerful actors who take messages about the environment home and influence their families and the communities around them.<sup>58</sup> One of the most revealing aspects of this research was the high level of awareness

that children in impoverished schools with good teachers had about climate change and environmental issues. However, in other schools learners and teachers had limited understanding of the connections between parts of environmental systems.

Education and information are required about what systems are the most effective for adaptation to the impacts of climate change. Research conducted on the green economy in KwaZulu-Natal<sup>59</sup> revealed how households wishing to change their behaviour found it very difficult to discern which types of energy systems were the most effective in reducing energy consumption. A hub or unit needs to be developed within government, which can provide information, best-practice guidelines and support to those who wish be part of the drive towards climate change citizenship.<sup>60</sup> Respondents in this study indicated that knowledge needed to be produced and training offered on how to shift the economy towards a green economy, which could contribute to both mitigation of and adaptation to climate change. Nevertheless, it is not only the process of education that is important. The nature and type of knowledge produced and an understanding of which actors hold the power in knowledge production are also critical to understanding the social barriers and opportunities for adaptation.

## Knowledge systems

The application of political ecology as an analytical framework enhances the potential for climate change adaptation and mitigation strategies to account for, and be informed by, locally constructed environmental knowledge and explanations, which are of pivotal importance, particularly for the most vulnerable communities. By emphasising the importance of rethinking knowledge, political ecology could thus facilitate a restructuring of environmental understanding and politics. This would be a 'more positive and interventionist approach to environment and social justice than classical positions', and would be of central importance to climate change mitigation and adaptation plans.<sup>61</sup> The development of brochures for the World Cup 2010 and short information pieces in local newspapers in the eThekweni Municipality reveal that the city's focus has been on residents in the middle- to upper-income brackets, and on knowledge that has been produced about how these types of households should respond to climate change. The knowledge required for adaptation at the low-income or informal level has not been produced for public distribution. Mdluli and Vogel's paper on the continued use of coal

for household energy in townships, which is driven by a variety of social, economic and cultural reasons, reveals how important it is to understand the reasons for patterns of use that emerge if changes to residents' behaviour is to be achieved in the future. They state that 'although the major obstacles preventing people from discontinuing domestic coal combustion are poverty, the ready availability and social acceptability of coal, together with other social customs cannot be underrated'.<sup>62</sup>

It is, therefore, important to recognise that there is a plurality of knowledge around the issue of climate change, including local and indigenous knowledge, which challenges scientific knowledge. Wynne notes the mistrust of science by the public and that the public's uptake of knowledge from science depends on the trust and credibility that the public ascribes to government institutions that disseminate scientific information.<sup>63</sup> As such, it is proposed that a new form of public knowledge must be sought that is more legitimate and less alienating, and which includes the substantive knowledge of science and the cultural knowledge of values.<sup>64</sup> This analysis is particularly relevant in developing countries where there are substantial bodies of indigenous knowledge and value systems that inform individual practices in relation to the environment.

Magistro and Roncoli, in their paper on anthropological perspectives on climate change, emphasise 'the importance of cultural meanings, collective myths, and social memory in shaping public and private responses' to climate change.<sup>65</sup> They assert that cultural perspectives shape how ordinary citizens receive new information about climate change and also how they trust the information and the experts producing the information. Moreover, they propose that objective scientific accounts of climate change need to be complemented with interpretive frames of knowledge which include local knowledge and indigenous knowledge.<sup>66</sup>

Therefore, any attempt to address adaptation must consider the social and cultural drivers of use. The same argument holds true for high-income households that are designed to be 'green'. These households make use of technology to address climate change issues, but there is little change in behaviour to lower consumption, as the notion these households use to continue with 'business as usual' in terms of consumption, is that the technology they have is making the difference. This is also a social construct that has been produced in popular magazines that produce the knowledge about, and sell the concept of, 'green buildings'.

## Adaptation across the socio-economic spectrum

South African society is one of the most unequal societies in the world. The steep social and economic gradients that exist in South Africa create different trends in terms of responses to climate change. These are defined by differing levels of resource consumption, education, access to information, social and cultural dynamics, and expectation. Swilling and Sutherland et al. have analysed the different spaces or neighbourhoods in the cities of Cape Town and eThekweni in terms of their ecological footprints.<sup>67</sup> These spaces or neighbourhoods were classified according to key characteristics reflecting their relationship with a low-carbon future and hence their ability to both mitigate and adapt to climate change. Both studies reveal the challenges at both ends of the socio-economic spectrum. The high-income users need to adapt by reducing their significant consumption. However, these groups of users prefer to continue with 'business as usual', and are not willing to suffer the discomfort of changing their high-consumption lifestyles. They will tend to use hard measures, such as new technology, to change their energy profile in response to higher costs, rather than shifting the softer measures that require behavioural and lifestyle changes. It is, therefore, important to explore what becomes symbolic for high-income households in their shift to climate change citizenship – do they increase their insurance against risk? Do they symbolically show and talk about their new low-carbon technologies while still using vehicles with high fuel consumption as their mode of transport? Or do they shift their behaviour in meaningful ways?

In South Africa, in particular since the commencement of social and political transformation in 1994, the majority of the population have developed expectations of improved levels of living and, with that, have increased their levels of consumption. Poor residents have expectations of development, and the path proposed for their development has traditionally followed the high-consumption patterns of those that have access to services and a good quality of life. Swilling<sup>68</sup> and Breetzke<sup>69</sup> argue that the development of poor communities in South Africa needs to adopt a 'sustainable development' approach whereby housing and service delivery take into account the need to reduce consumption and move away from models that have high costs in terms of the social and physical environment.

One of the central challenges is that new forms of development and service provision that are responsive to climate change are often

considered to be inferior by the recipients of these plans and technologies. There is resistance to solar energy as a form of energy supply, as residents consider this to be inferior technology to electricity. They have a vision of development that is based on the high-consumption service provision of the past. The aspirations of the poor can, therefore, act as barriers to a low-carbon lifestyle.<sup>70</sup> Schiermeyer's research on climate change education in eThekweni Municipality also reveals how, based on their historical disadvantages, African township inhabitants are not open to the idea of receiving solar energy, while white people are still using coal-powered energy.<sup>71</sup> According to a respondent she interviewed in her study:

There is a strong notion of solar energy being 'second-class' energy assigned to Africans, while 'first-class' coal-powered energy is consumed by whites ... Several municipal officials and NGOs predict that township inhabitants would only start to accept renewable energy once the majority of the richer inhabitants have switched to solar energy.<sup>72</sup>

Gibson et al.<sup>73</sup> note that economic class is an important variable when targeting low-carbon awareness-raising programmes. Affluent, educated households, while being the strongest supporters of 'green practices', are also the highest consumers of products that produce high carbon emissions. This way, low-carbon citizenship becomes equated with upper and middle classes, which in South Africa reveals a race dimension.

### **The role of social networks in influencing adaptation possibilities**

Strong social networks and community cohesion are widely emphasised as central to facilitating climate change adaptation. As Adger et al. argue, social capital and joint community initiatives and actions can create a solid base for coping with and adapting to climate change and weather extremes.<sup>74</sup> Indeed, adaptation to climate change requires joint initiatives across socio-ecological systems. The presence of social networks and sense of community within the case study contexts was often weak, with many research participants explaining that 'everyone here is for themselves (female, 63)' and 'we don't call on our neighbours when we need help after floods, we can't, we all need to look after our own households here (male, 50)'.<sup>75</sup>

Although there are certainly examples of communities across South Africa and the SADC region that exhibit strong social ties, a lack of social networks is an aspect that needs to be addressed when developing adaptation measures. For instance, community-building efforts should be incorporated into the development of adaptation measures where possible.

## Psychological masking

Literature on the social construction and amplification of risk is useful in understanding why and how people both amplify and reduce their understanding and estimation of risk.<sup>76</sup> This is because the ‘investigation of risk is at once a scientific activity and an expression of culture’.<sup>77</sup> The research conducted for this paper revealed signs of what is known as ‘psychological masking’, which means the tendency to underestimate a risk or problem, as opposed to dealing with the stress of admitting risk or existence of a threat.<sup>78</sup> Many urban and rural dwellers living in vulnerable locations, such as river-estuary banks and unstable hill slopes, who have been adversely affected by extreme events often underestimated or played down such risks in discussions. Indeed, many interviewees stated that they did not feel that they were vulnerable or at risk, but this conflicted with previous statements regarding experiences of extreme events and associated impacts and losses.<sup>79</sup> This form of psychological masking can be understood as a coping mechanism for these participants, who often do not have suitable alternative response options, such as relocation, or who inhabit precarious environments through government housing schemes or informal settlements as a matter of necessity.<sup>80</sup>

Nevertheless, such coping mechanisms are likely to lead to maladaptation and increased threats to their livelihood. Similarly, several wealthier interviewees who have *chosen* to live in a vulnerable location (e.g. Isipingo River estuary bank) and invested a great deal of money in their property also showed signs of psychological masking in the form of reluctance to admit personal vulnerability (although many of their properties had been flooded in previous years).<sup>81</sup>

## Gender

Gender roles, which are still notably traditional in semi-urban and rural environments within the SADC region, are embedded within culture

and belief systems.<sup>82</sup> Gendered differences in vulnerability to climate change are increasingly emphasised in the climate change literature. It is important to consider gender influences at the household or community scale, as well as at policy and institutional levels, since households and communities are embedded within overarching institutional and policy frameworks. Drawing from her research in eThekweni Municipality, Schiermeyer explains that it is important to understand gender-related roles, such as who is the household decision maker and who is most likely to be the catalyst for change and responsible for household chores.<sup>83</sup> Such factors strongly influence responses, and by extension vulnerability, to climate change.

Building on this, with regard to her study based in Limpopo, South Africa, Vincent explains that institutions and policies are seldom gender-neutral and it is important to consider gendered effects to avoid unintentionally exacerbating households' vulnerability to climate variability and change.<sup>84</sup> In short, gendered considerations need to be at the forefront of adaptation measures and support institutional and policy frameworks if gender equality, particularly in terms of vulnerability to climate change, is to be ensured.

### **Role of religious and cultural belief systems in shaping understandings and responses to climate change**

Human understanding of weather and climate is highly diverse. Rancoli et al. explain that 'in many communities, weather and climate are understood as part of a universe infused with spiritual significance', and climate variability and change can be explained in relation to the violation of cultural, social and religious norms.<sup>85</sup> Folklore and deep-seated religious beliefs are widespread and have long histories in many cultures.<sup>86</sup>

Leck's research points to the centrality of religious and cultural belief systems in shaping understandings and responses to climate variability and change in the South African context and more broadly.<sup>87</sup> One of the most revealing factors was that many research participants, particularly those from rural areas and townships, relate changes in the weather and climate to God. This reflects a fatalistic approach whereby communities believe that these events and their impacts rest with a higher power.

Other belief systems, such as cultural frames and symbols, also influence how communities respond to climate change events. Many respondents, particularly older people in rural areas, attributed extreme

events, changes in the weather and climate change to supernatural forces. For example, in Leck's study the *Nkanyamba* (explained in different ways, but predominantly as a snake in the sky) was referred to by many Zulu participants who strongly believed in its powers. As one respondent from Ngcolosi in eThekweni explained:

I heard the story of the *Nkanyamba*, when it changes dams, the weather changes to flooding, you see, it is a big snake in the sky, when it has babies it needs to move dams and it travels in the clouds causing big rains as it goes (female, 37).<sup>88</sup>

Furthermore, witchdoctors and ancestors were commonly noted as having the power to control the weather: 'There is a well-known witch-doctor in Umbumbulu, he can control the weather, and if he wants it to rain it will and if he doesn't it won't (male, 27)'.

With regard to the significant force of ancestors, one respondent explained: 'These things are happening because our ancestors are angry with us. We need to appease our ancestors, we need to go back to our roots (male, 52)'.<sup>89</sup>

The research findings clearly illustrate the significance of cultural frameworks in shaping the way in which people conceptualise environmental phenomena and, in turn, influence behavioural patterns and adaptation to climate change. Often information regarding the myths, folklore and religious interpretations that inform conflicting belief systems are communicated orally, rather than in writing.<sup>90</sup> This makes it difficult to document and trace these understandings and include them in adaptation decision making. This reinforces the need for increased community participation and deliberative governance.

These cultural and social frameworks often result in a sense of disempowerment and inaction in the face of extreme events and climate change, with many respondents highlighting that there is nothing that can be done to prepare for climate change impacts. For instance, despite being flooded numerous times, peri-urban households located on floodplains in the Umzinto area often ignore the inherent risk of their location on the assumption that such events are rare and that they are the result of a supernatural force that one cannot prepare for.<sup>91</sup> As Heyd argues, such risky behaviour is also attributable to interconnected factors, such as economic and social marginalisation. However, in some instances, the influence of people's cultural frameworks can be a key factor in risk.<sup>92</sup> Indeed, 'culture may be one of the most important characteristics



for some societies, where culture alone may decide whether the people will be adversely affected by climate change or disaster risk'.<sup>93</sup>

While deep-seated religious and cultural beliefs and linked narratives and myths can evidently act as potential barriers to adaptation, they can also act as enablers. Shared religious and cultural beliefs can act as starting points for collaboration and a platform for engagement over climate change issues, and foster community cohesion.<sup>94</sup> This points to the necessity to involve communities in the development of adaptation measures, since 'change should be developed from within cultures rather than from without'.<sup>95</sup> On a cautionary note, culture is open to co-optation and exploitation by both insiders and outsiders. There are, therefore, close relationships between culture and power that require close attentiveness in adaptation and other decision making processes.

## Conclusion and Policy Considerations

Climate change impacts and understandings, as well as responses and vulnerability to climate change, manifest differently in different contexts and across socio-economic spectrums. Although there is great value in drawing from experiences and lessons from a range of contexts, it is important to avoid adopting blueprint approaches for adaptation. Adaptation measures need to be contextually appropriate and tailor-made. This is particularly important when considering complex social and cultural influences, as discussed in this chapter. Meaningful participation and deliberative decision-making processes are necessary for such influences to be effectively accounted for in the development of climate change adaptation measures. Furthermore, culturally rich and diverse contexts, such as South Africa and the rest of the SADC region, preclude technocratic and top-down approaches to climate change adaptation, which do not account for such diversities. Indeed, the implementation of adaptation and mitigation policies will be meaningless and ineffective in the absence of community participation and ownership.

Climate change citizenship, which this chapter advocates, requires effective multi-level and networked governance characterised by cross-cultural collaboration and cooperation among all stakeholders, underpinned by a consideration of social and cultural factors that shape both individual and societal responses to climate change.

The social and cultural barriers to the implementation of adaptation measures discussed in this paper need to be transformed into facilitators, while existing social and cultural opportunities need to be

enhanced. The growing need to adapt to climate change should be seen as an opportunity to foster climate change citizenship and develop policies that meaningfully account for social and cultural influences. More research is needed within the SADC region, and indeed worldwide, to enable us to understand the complexities of social and cultural influences on climate change mitigation and adaptation measures, and how best to incorporate these into policies and institutional frameworks.

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## Economic barriers to climate change adaptation implementation in SADC

*Sheila Kiratu*

### Introduction

Although the climate across Africa has always been erratic, the United Nations Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (4AR) predicts that African countries are most vulnerable to climate change. The continent is expected to face ever greater droughts, floods, rising sea levels, food insecurity, loss of biodiversity and depletion of the water supply. These are but the physical impacts of climate change. In addition to these are impacts of an economic nature, which relate to how governments and society, both nationally and abroad, respond to the climate challenge. The economic impacts of climate change have a bearing on how African economies develop and thrive, or decline and fail. This makes adaptation to climate change a high priority in the region because it entails taking the right measures to reduce the negative effects of climate change or making the appropriate adjustments and changes.

The objective of this chapter is to identify government policies or measures, as opposed to autonomous adaptation,<sup>1</sup> as the potential to adapt will be rooted in sound public global and national policy. This, in turn, may decrease or increase the vulnerability of Southern African economies in the face of climate change. In spite of the scope of the chapter, it should be noted that adaptation is a challenging policy imperative that is specific to each individual country and economic sector, and hence is difficult to deal with on a regional basis. It is for this reason that efforts

to design adaptation strategies, commonly known as national adaptation programmes of action (NAPAs), take a more local approach that incorporate country-specific characteristics and socio-cultural and economic conditions. On the other hand, applying a macro-level approach to both developing and least developing countries in Southern Africa reveals the overall barriers to adaptation and even boosts the collective engagement of these countries in international negotiations.

Although the 4AR provides several adaptation strategies for dealing with the impacts of climate change, there has not been any significant attention given to identifying and addressing the economic ramifications brought on by regulatory and policy shifts mushrooming as the science of climate change becomes broadly accepted. Indeed, most Southern African countries are finding it difficult to implement adaptation activities as a result of a number of economic barriers, limits and costs that have not been fully understood.

## **Climate Change in Southern Africa: What is at Stake?**

The economic development process is under threat from climate change. Although the African continent's contribution to climate change is the least, it is the region that is experiencing, and is going to experience, the greatest impact from climate change. A UN report<sup>2</sup> on the impact of climate change on least developing countries (LDCs), landlocked developing countries and small island developing states (SIDS) underlines the fact that these countries emit very little greenhouse gases (GHGs), considered as the major cause of climate change, but they will be the most affected because of their weak capacity to adapt. Apart from South Africa, all the member states of the Southern African Development Community (SADC) fall under one of these three categories.

Articles 4.8 and 4.9 of the United Nations Framework Convention on Climate Change (UNFCCC) Kyoto Protocol go as far recognising LDCs and SIDs as the most vulnerable to the effects of climate change. Vulnerability is understood as the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change and the resultant interactions between socio-economic conditions (e.g. poverty, income distribution, existing infrastructure) and institutional settings (e.g. quality of public governance, rule of law, decentralisation) that affect its adaptive capacity.<sup>3</sup>

Vulnerability, particularly in developing countries, is heavily influenced by poverty, because as a rule, the poor are more dependent on

the direct use of natural resources and because they have less buffer capacity with regard to economic damages caused by natural disasters. Adapting to climate change is, therefore, a great responsibility of the public administration: anticipatory measures for controlling risk and dangers require collective action and public expenditure in terms of infrastructure, research, technology development and deployment, information and advice concerning groups at risk, and changes in decision-making procedures in the public realm.<sup>4</sup>

### Climate change: Present reality and predictions

Some studies on climate change in Africa predict a variation of temperature and precipitation in the future,<sup>5</sup> and others<sup>6</sup> show that climate change is already a reality in Africa. During the last five decades, Africa has experienced a 1 per cent increase in the average temperature. One consequence of the rise has been an increase of floods in some countries, causing damages to local economies. Mozambique is a case in point. In 2000 floods led to the displacement of about 2 million people and the loss of 350 000 jobs.<sup>7</sup> Table 5.1 summarises some of the existing studies on the projections of temperature and precipitation for the African continent.

**Table 5.1 Climate change projections in Africa**

| Author              | Southern Africa |               | Central Africa |               | East Africa |               | West Africa |               |
|---------------------|-----------------|---------------|----------------|---------------|-------------|---------------|-------------|---------------|
|                     | Temperature     | Precipitation | Temperature    | Precipitation | Temperature | Precipitation | Temperature | Precipitation |
| Nkomo et al. (2006) | Increase        | Decrease      | Increase       | Increase      | Increase    | Increase      | Increase    | Increase      |
| IPCC (2007)         | Increase        | Decrease      | Increase       | Increase      | Increase    | Increase      | Increase    | Decrease      |
| Cline (2007)        | Increase        | Decrease      | Increase       | Increase      | Increase    | Increase      | Increase    | Increase      |

**Sources** Cline, W., 2007. *Global warming and agriculture: Impact estimates by country*. Washington: Centre for Global Development and Peterson Institute for International Economics; IPCC, 2007. *Climate change: Impacts, adaptation and vulnerability, working group II contribution to the Intergovernmental Panel on Climate Change Fourth Assessment Report*. Geneva: IPCC; Nkomo J.C., Nyong A.O., and Kulindwa K., 2006. Impact of climate change in Africa. In the *Stern Review on the Economics of Climate Change*.

All climate projections indicate that the warming is expected to continue in Africa. Nkomo et al. estimate that the temperature could increase between 1,5° and 6 °C by 2100. In the same way, the 2007 report of the IPCC indicates for the period 2080–2099 an increase in the median temperature of between 3° and 4 °C compared to the period 1980–1999. Nevertheless, not all African regions will be equally affected. Equatorial and coastal areas will experience a low increase of temperatures, whereas the increase in the western Sahara and Southern Africa will be high. In some regions, the increase will be as great as 7 per cent (Southern Africa in September and November) and 9 per cent (North Africa, Mediterranean coast). Thornton et al. contend that with the current level of GHG emissions, the temperature is expected to increase by 0,2 °C per decade. Moreover, according to these scholars, even if the emissions level of 2000 remains constant, the temperature may increase by 0,1 °C per decade. Table 5.2 gives the present and future climate conditions for a selection of SADC countries.

**Table 5.2 Present and future climate for Commonwealth African LDC, SIDS and LLDS**

| Country    | Temperature (°C)    |                    |                | Precipitation (mm per day) |                    |           |
|------------|---------------------|--------------------|----------------|----------------------------|--------------------|-----------|
|            | Present (1961–1990) | Future (2070–2099) | Variation (°C) | Present (1961–1990)        | Future (2070–2099) | Variation |
| Botswana   | 20,57               | 24,91              | +4,3           | 0,93                       | 0,80               | –0,13     |
| Lesotho    | 20,57               | 24,91              | +4,3           | 0,93                       | 0,8                | –0,13     |
| Malawi     | 21,79               | 25,72              | +3,9           | 3,1                        | 3,04               | –0,06     |
| Mozambique | 23,44               | 27,28              | +3,8           | 2,82                       | 2,80               | –0,02     |
| Swaziland  | 20,57               | 24,91              | +4,3           | 0,93                       | 0,8                | –0,13     |
| Tanzania   | 22,25               | 26,01              | +3,8           | 2,88                       | 2,91               | +0,03     |
| Zambia     | 21,57               | 25,86              | +4,3           | 2,75                       | 2,61               | –0,14     |
| Zimbabwe   | 21,03               | 25,39              | +4,4           | 1,85                       | 1,81               | –0,04     |

Source Adapted from Cline, W., 2007. *Global warming and agriculture: Impact estimates by country*. Washington: Centre for Global Development and Peterson Institute for International Economics.

The temporal evolution of temperature displayed in Table 5.2 indicates an increase of temperature for all the countries shown. This increase is between 3,5 and 4,4 per cent. Analysing the temperature trend over

25 years (1976–2000) for some African countries, Rautenbach (2007) shows that apart from the west coast of South Africa and northern Kenya and Ethiopia, all other African countries south of the Sahara are becoming warmer, with the highest increase of temperature being in Southern Africa.<sup>8</sup> Furthermore, Clain's projections of precipitations report a decline of precipitation in the region of between 15 and 62 per cent, which will essentially affect rainfall.

These changes in the climate are critical and damaging to economic development in the region, as many countries will experience increased aridity and crop failure. The projected changes will have an impact on various economic sectors and many other aspects of life, including food security, health and biodiversity. As one of the poorest regions, Africa is considered the most susceptible to climate change due to its vulnerability and inability to cope with and adapt to the consequences of climate change. Most African populations depend heavily on natural resources for their livelihoods, making them vulnerable to any change in those resources. Bohle et al. consider 'vulnerability' as an exposure to contingencies and stress, and difficulty coping with them.<sup>9</sup> Therefore, an individual or a country is vulnerable when the level of exposure to crises, stress and shocks is high, capacities to cope with the stress, crises and shocks are weak and inadequate, and when the risk of incurring severe consequences is high. Therefore three concepts can be used to define vulnerability – exposure, capacity and potentiality.

Although Africa's annual share of worldwide CO<sub>2</sub> emissions is only 3,6 per cent, the IPCC predicts that 'the effects of climate change are expected to be greatest in developing countries in terms of loss of life and relative effects on investment and economy'.<sup>10</sup> The continent's vulnerability to climate variability is visible in the continent's challenges of water shortages and food security due to declining precipitation and soil moisture, deforestation, loss of forest quality, degradation of woodlands and the spread of disease-vector habitats due to temperature rise,<sup>11</sup> with the economic impacts being felt particularly in the agriculture, forestry and fisheries sectors.

## **Overview of Climate Change Impact on Key Economic Sectors**

Several studies have highlighted the fact that countries will not be equally affected by climate change. Developed countries are likely see

their agricultural production increase, whereas the developing countries in Africa that are deemed to have a comparative advantage in the sector, will become importers of food from Europe and Latin America.<sup>12</sup> Estimating the potential impact of climate change scenarios on crop yield of cereals, Parry et al. point out a contrast in the change of crop yield between developed and developing countries. They show that, taking into account the effect of GHGs, the impact of climate change on the production of cereals is positive in developed countries and negative in developing countries. However, compared to other developing countries, agricultural production in Africa will experience more negative effects of climate change. Results of different special reports on emission scenarios (SRES) show that the production of wheat, maize, rice and soybean will experience in average a decrease of 10 per cent by 2020 and more than 30 per cent by between 2050 and 2080.<sup>13</sup>

Using the reduced-form model to estimate the market impact of climate change, Mendelsohn et al.<sup>14</sup> show that Africa is the most affected. With a temperature increase of 2 °C by 2060, the African agriculture sector is expected to lose US\$132 billion, or 4,7 per cent of its gross domestic product (GDP) (see Table 5.3).

**Table 5.3 Impact of climate change on agriculture sector and GDP**

| Variable                 | Africa | Asia | Latin America | Europe | North America | Oceania |
|--------------------------|--------|------|---------------|--------|---------------|---------|
| Agriculture (\$ billion) | -132   | -220 | -78           | 148    | 86            | -19     |
| % GDP                    | -4,7   | -0,8 | -1,3          | 0,4    | 0,3           | -1,9    |

Source Mendelsohn, R., Morrison, W., Schlesinger, M.E. and Andronova, N.G., 2000. Country-specific market impacts of climate change. *Climatic Change*, 45(3–4), pp.553–569.

However, it is important to note that African agriculture is largely rain-fed. According to Harmeling et al.,<sup>15</sup> only 7 per cent of African agricultural is irrigated; the remaining 93 per cent is, therefore, exposed to the change in the levels of temperature and precipitation. These findings predict disastrous effects in the variation of temperature and precipitation for agriculture. Analysing the impact of climate change on Southern African agricultural productivity, Rautenbach<sup>16</sup> shows that the southern African countries are likely to be the most affected by climate change. Wheeler obtained the same results, summarised in Table 5.4.

**Table 5.4 Impact of climate change on agricultural productivity in 2050**

|                                       | Lesotho | Malawi | Mozambique | Rwanda | Sierra Leone | Uganda | Tanzania | Zambia | Zimbabwe |
|---------------------------------------|---------|--------|------------|--------|--------------|--------|----------|--------|----------|
| Loss in agricultural productivity (%) | 63,1    | 52,1   | 36,1       | 65,9   | 54,4         | 28     | 40,3     | 65,9   | 63,1     |

Source: Adapted from Wheeler, D., 2011. *Quantifying vulnerability to climate change: Implications for adaptation assistance*. Washington: Center for Global Development, Working Paper 240.

The vulnerability of these countries in terms of food security is already evident, but the losses these countries are currently incurring in the agriculture sector will almost double by 2080. Mozambique, Lesotho, Malawi, Swaziland and Zambia are the most vulnerable to climate change when considered in light of the contribution of the agriculture sector to their GDP, as shown in Table 5.5.

Furthermore, the increased risk of species extinction, for example, which will adversely affect sectors reliant on biodiversity and natural resources in Southern Africa, such as fisheries. This sector is under severe pressure from overfishing, and factoring in the effect of climate change makes the situation worse. Currently, oceans are capturing more CO<sub>2</sub> than ever before, making the water more acidic than the ecosystem can handle. The increased acidity has been known to impair fish larvae from developing to adulthood. A similar phenomenon is apparent in lakes and other smaller water bodies. Changes in climatic conditions also affect fisheries by altering habitat availability or quality.<sup>17</sup>

The study by Edward Allison et al. shows that marine and freshwater ecosystems will be the most affected by climate change. Two-thirds of the most vulnerable countries in this sector are in tropical Africa, where fishery activities are greatly affected by climate variation. Malawi, Mozambique, Tanzania and Zambia will be the most affected in SADC, since fishery exports are important to these countries and a reduction in fishing production could result in a reduction of revenues (individual and national) generated by the trade.<sup>18</sup>

In terms of the SIDS that form part of the Southern African region, it is important to underline the fact that very few studies have attempted to quantify climate change impacts for Mauritius and Madagascar. Nevertheless, as the 2007 IPCC report indicates, these islands, in

**Table 5.5 Share of agriculture, total exports and GDP**

| Country    | Agriculture (total exports, %) |           |      |      |      |         | Agriculture contribution to GDP (%) |      |      |      |      |         |
|------------|--------------------------------|-----------|------|------|------|---------|-------------------------------------|------|------|------|------|---------|
|            | 1999–2001                      | 2003–2005 | 2006 | 2007 | 2009 | Average | 2000                                | 2003 | 2005 | 2007 | 2009 | Average |
| Botswana   | 4,6                            | 1,5       | 1    | 2,9  | 3,1  | 2,3     | 3                                   | 2    | 2    | 2    | 2    | 2,1     |
| Lesotho    | 1,5                            | 0,3       | 0,6  | 0,2  | 0,2  | 0,4     | 12                                  | 10   | 9    | 8    | 8    | 9,3     |
| Malawi     | 93,1                           | 90,9      | 95,2 | 91,2 | 89,3 | 91,9    | 40                                  | 36   | 33   | 30   | 31   | 33,8    |
| Mozambique | 13,1                           | 8,7       | 13,3 | 12,2 | 12,4 | 11,8    | 24                                  | 28   | 27   | 28   | 31   | 27,5    |
| Swaziland  | 28,7                           | 14,6      | 16,9 | 9,1  | 15,3 | 15,8    | 12                                  | 10   | 9    | 7    | 7    | 8,8     |
| Tanzania   | 70,5                           | 32        | 29   | 29   | 31   | 35,8    | 33                                  | 33   | 32   | 30   | 29   | 31,4    |
| Zambia     | 12,2                           | 18,3      | 8,6  | 8,6  | 6,8  | 10,2    | 22                                  | 23   | 23   | 22   | 22   | 22,4    |
| Zimbabwe   | 53,5                           | 46,2      | 53,5 | 23   | 24,3 | 37,5    | 18                                  | 17   | 19   | 23   | 18   | 18,9    |

Source Adapted from the World Bank, n.d. Database. Available at: <http://data.worldbank.org/indicator/NV.AGR.TOTL.ZS/countries?page=1>. Washington, DC: The World Bank; The Food and Agriculture Organization of the United Nations (FAO), 2010. *Share of Agricultural imports and exports in total imports and exports*. Available at: [http://www.fao.org/fileadmin/templates/ess/test\\_folder/Publications/yearbook\\_2010/c02.xls](http://www.fao.org/fileadmin/templates/ess/test_folder/Publications/yearbook_2010/c02.xls) [Accessed 1 June 2011]. Rome: FAO/STAT (FAO Statistics Division).



spite of their geographic location in the tropics and higher latitudes, are also vulnerable to climate change. One of the impacts of climate change is the rise of the sea level, which is likely to cause flooding. Completely exposed to the sea, these SIDS are particularly vulnerable to damage that will result from the rise in the sea level. The report argues that the erosion of beaches and coral bleaching will reduce their attraction as tourism destinations and will affect local resources such as fisheries, which contribute to more than 10 per cent of the GDP of many SIDS.<sup>19</sup> In 2001, the tourism sector also represented a high proportion of GDP – 21 per cent and 13 per cent for the Seychelles and Mauritius, respectively.<sup>20</sup> Combined with the agricultural effects of climate change, the effect on the tourism sector could be catastrophic for the two economies. The tourism sector will also be affected on the mainland SADC countries that have been facing recurrent droughts and land degradation, reducing the feasibility of recreation activities and wildlife safaris.<sup>21</sup>

The impact of climate change on health in Africa has been established by many studies.<sup>22</sup> According to AR4, the population's health will be affected by increases in malnutrition and consequent disorders, with implications for child growth and development; increased deaths, disease and injury due to heatwaves, floods, storms, fires and droughts; increased incidence of diarrhoeal disease; and increased frequency of cardio-respiratory diseases due to higher concentrations of ground-level ozone linked to climate change. In this situation, besides the cost of treatment, which will increase substantially, the region could also face other indirect costs, such as reduced income of affected individuals, increased expenditure of affected families, diminished quality of life, social disruption and reduction in GDP.<sup>23</sup>

Southern Africa is further exposed to climate change policies and politics by virtue of the region's economic connections to South Africa. South Africa dominates regional production and trade accounting, with approximately 58 per cent of SADC's total output in 2008. Moreover, South Africa accounts for 50 per cent of the region's total exports. It also straddles the major road and rail transportation networks, and supplies electricity from coal-generated power to several countries, particularly in the Southern African Customs Union (SACU). Its companies are major investors in SADC countries, bringing growth, employment and development (albeit not without controversy). Therefore, whatever mitigation commitments South Africa makes will have consequences for its neighbours' economic sectors.

As has been shown in this section, reliance on natural resources by Southern African countries threatens their economies and their populations' livelihoods if affected by climate change. The key towards effective climate change adaptation by these countries lies in building domestic economies that are diversified and more productive in sectors that are not as vulnerable to climate change impacts. The protagonists of this argument maintain that 'development enables an economy to diversify and become less dependent on sectors such as agriculture that are more likely to be affected by climate change'.<sup>24</sup> For example, as most of the LDCs in SADC rely on agriculture, they will need to diversify their economies to create non-agricultural employment opportunities.

Many elements explored in this book are necessary to carry out effective adaptation in SADC, but the two key barriers that hamper diversification efforts include, firstly, the availability of economic resources and other assets that would support the costs of adaptation and, secondly, the policy/regulatory barriers that affect climate-sensitive sectors and require climate-adaptive changes in international trade policy. The latter is important because most countries in the region are either LDCs or developing countries that look towards trade as a driver of economic growth. Trade policy will, therefore, be an important element in strengthening these countries' resilience to climate change's physical impacts and the international regime being developed to counter these consequences. The following section examines the policy constraints that stand in the way of making economies more resilient to future climate variability.

## **Economic Barriers to Climate Change Adaptation**

### **Insufficient economic resources**

#### ***Budgetary constraints and insufficient investment or capacity to tackle adaptation***

Economic and financial resources are cornerstones of adaptation<sup>25</sup> because the spending capacity is an important factor to be considered in analysing the cost of, and access to, adaptation tools as well as supporting national investment in skill and competencies to support low-carbon industries and initiatives. In developed countries, governmental authorities and the private sector as a rule create the necessary capacity to facilitate public and private, planned and autonomous adaptation. In developing countries, however, the general fragility of public and private

institutions makes support from rich countries, which have contributed most to climate change, paramount.

Fortunately, the need for massive external support for adaptation to climate change has been emphasised in the UNFCCC, and has been repeated several times since, especially at the conference of the parties to the convention in Nairobi in 2006. In essence, the argument being advocated is that in relation to sources of adaptation finance, dependence in sub-Saharan Africa must not be placed on national budgets or public expenditure. Instead, these countries would have to look to international, multilateral or bilateral funding, which could be channelled through the UNFCCC process or obtained from the World Bank or individual sources of finance.

There have also been moves to channel traditional aid flows towards adaptation, actions which are patently criticised by the Oxford Report on the grounds of adequacy and predictability.<sup>26</sup> The first premise is that official development assistance (ODA) is not enough to meet current adaptation estimates and, secondly, national funding by developed countries would be trumped by sovereign interests. The solution advocated in the Oxford Report is the sourcing of funds through a process distinct from ODA, but allowing existing mechanisms/institutions to utilise funds raised in this manner. Better estimates of the overall budget implications of implementing climate-resilient development are needed both to enable developing countries to implement their national development strategies and inform discussions concerning international assistance.

There are risks to relying on external funding, as exemplified by the fact that most of the adaptation programmes or projects in Africa are funded, through the Global Environmental Facility and the newly launched Africa Adaptation Programme, channelled and implemented by the World Bank and UNDP, respectively.<sup>27</sup> Unfortunately, these initiatives have limited time frames, which act as a barrier to adaptation implementation, as they are often terminated before any real impact is felt on the ground. This also results in the lack of continuity of good programmes or activities because of the programme/project-specific nature of the initiatives. In some instances, governments and some stakeholders may be custodians of an existing model or measures that perhaps only need to be updated or modified, but due to lack of domestic investment in adaptation, this is often not possible. Adaptation is further limited due to a shortfall of organised markets for credit, as farmers may lack access to agricultural credit, fertilisers, alternative

seeds, and other requirements that are indispensable for succeeding in international agricultural markets.

## **Trade policy or market access-related barriers**

### ***Tariff liberalisation***

Economic theory emphasises trade liberalisation as crucial to ensuring the allocation of productive resources and helping countries diversify. Openness by SADC countries to imports would not necessarily be the appropriate climate-adapted policy response as these countries generally have very open trade regimes, with both imports and exports playing major roles in their economic profiles. But what of the further liberalisation of tariffs by SADC's trading partners? If viewed from the angle of SADC's main exports to its biggest trading partners in Western and Eastern markets, trade liberalisation in itself might not result in economic diversification, but rather catalyse specialisation and dependence on agricultural and mineral commodity exports. As one policy discussion paper notes, 'while the removal of tariffs may be important in allowing producers to respond to market signals, trade policy measure and reform needs to be seen as part of a broader package of policy measures that are interlinked and need to be mutually supportive'.<sup>28</sup>

This need plays out in the debate on the liberalisation of clean technologies and their parent industries under the heading of environmental goods and services<sup>29</sup> (EGS) in the World Trade Organization (WTO) negotiations. Various reports have highlighted the potential gains from trade liberalisation of environmental goods (clean technologies) and services, but the trade question is whether reduction of tariff and non-tariff barriers actually increases trade in renewables and the deployment of renewable energy technologies. According to a World Bank 2007 study on international trade and climate change, the removal of tariffs for four basic clean-energy technologies (wind, solar, clean coal and efficient lighting) in 18 developing countries would result in trade gains of up to 7 per cent.<sup>30</sup> This would contribute positively to efforts of putting economies on low-carbon growth paths and adapting to climate change. Some analysts have found that tariff reduction may make trade easier, but is unlikely to generate markets.<sup>31</sup> Nevertheless, developed countries are convinced that tariff reduction may make trade easier and have proposed at the WTO that countries bring down tariff barriers on clean technologies to aid their diffusion.

From a long-term perspective, developing countries wish to build up their own productive and technological capacities in this area and are concerned that they might unintentionally end up liberalising far more goods than just those with an environmental end use. Moreover, such liberalisation may prevent the development of nascent clean-tech domestic industries, impacting on diversification efforts.<sup>32</sup> Concerns have also been raised that the liberalisation of EGS will have a bearing on the finances of developing countries, as tariff cuts have large implications on government revenue from import taxes. Since LDCs have generally higher tariffs on environmental and energy-efficient goods than developed countries, the tariff revenue gains from these products needs to be taken into account. As such, developed countries should recognise developing countries' needs for flexibility with respect to policy shifts and measures for agricultural and industrial diversification programmes. There should be no pressure exerted to require LDCs, in particular, to provide for additional market access to their trading partners that may not be appropriate in the context of those countries' requirement for policy space for climate adaptation of their trade and industrial policy.

### ***Intellectual property rights***

A range of technologies are needed for adaptation, including technologies for water saving, water capture and reuse; disease and pest-control; and desertification control, among others. In the climate change negotiations, intellectual property (IP) rights have been identified as a disincentive for further research and development, as well as an obstacle to access to the protected knowledge by the broader public. In this regard, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) agreement are also viewed as a barrier to adaptation by hindering access to emerging climate technologies as well as limiting economic diversification efforts of developing countries. Article 66.2 of the TRIPS agreement states that 'developed country members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least developed country members in order to enable them to create a sound and viable technological base'.<sup>33</sup> Despite the spirit of this provision, high licensing fees and royalty payments have restricted the flow of climate-friendly technologies to developing countries, and the World Bank has called for the bundling of trade liberalisation with a package of technical and financial assistance to suit both developed and developing countries' needs.<sup>34</sup> There are those that have argued that investment in clean technologies and technology

transfer has been hampered by weak IP rights' protection in developing-country markets. African researchers have poked holes in this argument through evidence that shows that the 'constitution of technology transfer is not a conceptual issue but one based on evidence or real terms' by revealing figures in SADC that showed that increased investment did not necessarily mean that technology was transferred and neither did IP rights improve technological innovation or transfer of technology.<sup>35</sup>

### ***Standard and carbon labelling schemes***

The role of voluntary carbon labelling schemes is likely to grow in the future, providing consumers with the option of decreasing their personal carbon footprints. It is argued that these schemes provide opportunities for positive product differentiation and market opportunities for exporters into developed-country markets. The transport and agriculture sectors are the most vulnerable to private standards in developed-country markets.

One of the first experiments in the agriculture sector – the labelling of fresh produce that had been air-freighted from African countries with airplane stickers in supermarkets – generally missed the point and ended up hurting some of the poorest and most vulnerable countries.<sup>36</sup> Overall, the stickers singled out just one part of the process, namely transport, and ignored other parts of the process – the African countries' exporters were more carbon-efficient than their counterparts in developed countries. Under a different and fair scheme, the African countries may have been the beneficiaries. This debate, therefore, needs to be expanded to not just include road, air and sea transport, but to look at the total carbon emissions through the supply chain. Although the role of carbon schemes is likely to grow in the future, it is important to balance the need for accurate and useful data with the need to be transparent (by involving developing countries) and mitigating any additional transaction costs to them. Unfortunately, the WTO's Technical Barriers to Trade agreement essentially binds member countries rather than private organisations. However, developed countries can minimise the adaptation costs for developing countries by monitoring the creators of standards and carbon labelling schemes to consider their effect on developing countries.<sup>37</sup>

Besides private standards, sanitary and phytosanitary (SPS) measures are also barriers to adaptation, since they are primarily shaped by the developed world to suit their economic conditions and others. SPS measures are strict standards and regulations related to meeting high production

and hygiene requirements of potential markets such as the EU. Testing and certification are also among the barriers to local communities given their socio-economic background.<sup>38</sup> Toto and Thalwitzer examined the impact of EU sanitary demands for red meat trade on sustainable development in rural Namibia and found that although the high-value EU market currently yields very good returns, the authors advise that Namibia needs to follow up on the policy to diversify into other markets whose sanitary requirements can be met at a reasonable financial and social cost.<sup>39</sup> This point is considered in more detail in Chapter 6.

### ***Consumer preferences***

Consumers, increasingly concerned about the carbon footprint of products and services they purchase, are also reducing the market for certain suppliers and industries from developing countries. For example, the promotion of ‘local tourism’ within developed country markets has the potential to impact on tourism demand in other countries and creates a real risk for developing countries that rely to a considerable extent on tourism-based earnings. The air travel sector and cruise ship industry provide key services to the tourism sector in SADC, which are generally long-haul destinations from key source markets like Europe and North America. This notwithstanding, the transport sector is considered a major contributor to GHG emissions and there is growing concern regarding the taxation schemes and consumer movements that may deter holidaymakers from long-haul travel. Even in the absence of government measures, there are concerns among tourism authorities in African countries that as the climate change agenda becomes accepted by the general public, this may result in many tourists choosing to remain within their own country or region during their vacation period, which further limits diversification efforts.

### ***Subsidies***

Developed-country subsidies that support unfair competition with the products or production capacity of LDCs, whether in agriculture, industrial goods or fisheries, are also a barrier because the uncertainty of pricing that they create makes it difficult to precisely estimate the adaptation cost or future pricing for adaptation projects.<sup>40</sup>

### ***Border adjustment measures***

International emission-reduction commitments are already influencing economic development in industrialised nations, and markets are shifting

to offer an increased variety of low-carbon alternatives. This restructuring has begun to redefine the very basis of competitive advantage and exports of countries. For instance, curbing GHG emissions in one country or region creates spillover effects that may have detrimental effects on those attempting to reduce carbon emissions. Spillover effects can be positive or negative, and include effects on trade, carbon leakage, transfer and diffusion of environmentally sound technologies, and other issues.

The perception in some quarters, especially in developed countries, is that curbs may act as an incentive to affected industries in the constrained country/region to migrate to the non-constrained countries or regions, thereby undermining climate policy in the constrained country/region. Consumers may also shift expenditure to foreign substitutes produced under non-constrained circumstances, while foreign competitors may see an opportunity to expand their market shares in international markets. The possible relocation of industry to another jurisdiction and the loss of market share in international markets are a manifestation of the 'carbon leakage' and competitiveness problem created by the failure to harmonise international policies on curbing GHG emissions.

This real or perceived concern with the loss of competitiveness poses many challenges for developing countries, as developed countries impose border adjustment (tax) measures (BAMs) to address carbon leakage. To enable developing countries to adapt, such unilateral carbon-related boarder trade measures may have to be removed or carefully designed so as not to impose disguised restrictions or arbitrary or unjustifiable discrimination against exports from SADC countries. The EU and US are the proponents of these measures. Such measures may have a divisive impact on developing countries' trade positions, as it is likely that LDCs and countries with less than 0,5 per cent of global GHG emissions may be excluded. However, when such policies are officially adopted, goods from countries such as South Africa, which is a significant emitter of CO<sub>2</sub>, may be adversely affected. For instance, legislation in the US contains provisions for carbon barriers targeting China and other emerging economies, such as South Africa, currently not obliged to make emission reductions. BAMs are also very much part of the debate in the EU, and the European Parliament has called for 'border measures against climate free riders'.<sup>41</sup>

In summary, it is difficult to tell whether the above measures arise out of legitimate climate change concerns or whether they are disguised restrictions and unjustifiable discrimination against exports from



particular competing and/or developing countries. Indeed, their legality under the WTO has been questioned and recent studies have pointed to the ineffectiveness of unilateral trade measures to discourage climate change.

## Conclusion and Policy Considerations

The impact of climate change on economic output will have implications for economic development in Southern Africa. Therefore, while designing policies to combat climate change, analysts must consider both adaptation to be the tangible effect of climate change in economic sectors and the vulnerability of these sectors to climate change. This is crucial because one of the primary objectives of adaptation activities for developing countries is to build resilience in vulnerable communities and economic sectors, which can only be done by mainstreaming climate change in all policies, as envisaged by the NAPAs. The World Bank has also been advocating mainstreaming adaptation strategies into development policies. It has done a couple of studies in sub-Saharan Africa, and the study on Mozambique<sup>42</sup> has some specific recommendations:

The rationale for integrating adaptation into development strategies and practices is underlined by the fact that interventions are required to increase resilience to climate variability and change generally [and] further development objectives... [and] such processes [natural resource management, buttressing food security, development of social and human capital, and strengthening of institutional systems] besides building the resilience of communities... are good development practice in themselves.<sup>43</sup>

In relation to the identification of adaptation and mitigation priorities, the potential for harnessing the benefits of economies of scale, the attraction of additional regional resources and the decentralisation of administration and decision making, regional collective actions are better positioned to address climate change issues than multilateral institutions. These relate to supporting investment to mitigate climate change, where it has regional negative impacts, and being proactive in helping countries and regions meet adaptation to climate change challenges – for example through investment in adaptation technologies or practices. Therefore, it would be advisable for regional organisations also to engage with this issue. Indeed, SADC has shown its ability to do this through its Sub-Regional Action Programme to Combat Desertification in Southern Africa, in line with the UN Convention to

Combat Desertification (UNCCD). All of the countries in the Southern African subregion are party to the UNCCD, and Lesotho, Malawi, Swaziland, Tanzania and Zimbabwe have also produced NAPAs.<sup>44</sup> In fact, progress has been made in identifying areas of strength, and areas of weakness that require financing. Therefore, there is no reason why the region should not formulate strategies and tools for mitigating the impact of climate change.

Mbirimi<sup>45</sup> observes that what makes LDCs, SIDs and landlocked developing countries more vulnerable to international market volatility and shocks is that they often rely on very few goods and services for their exports. Such high export concentration exposes a country to severe losses when the demand for the few products it exports is negatively affected by external factors such as climate change and related policy responses. It is then obvious that to address the issue of climate change impacts on the trading capacity of African countries, policy makers in these countries must think about the diversification of their markets as well as diversification of their economies by encouraging investments in sectors that depend the least on climatic conditions.

SADC countries should also boost their climate research capacity in order to help them plan better, as well as bring to light opportunities that climate change can generate for their economies and think of strategies to benefit from these opportunities. This is the case, for example, of the transfer of climate-friendly technologies, and crops (if any) that could be profitably produced under new climatic conditions in relation to those which may have to shift from other suppliers. There is the opportunity for LDCs particularly to use aid for trade funds to apply subsidies, investment promotion measures or give support to enterprises that may support diversification away from current export commodities. Secondly, effective south-south cooperation could also be fostered in ways that address the technological and innovation challenge that the region faces. India and China in particular may be important sources of knowledge, and it would be useful to tap into these reservoirs, as well as explore the potential for business opportunities or investments in clean technology.

Since climate change is an almost irreversible process and is expected to continue in the future even in the most optimistic situation, developing countries should continue pressing for strong financial support packages and strategically position their economies through active, well-informed participation in the climate negotiations that are

underway in order to make their voice understood by their partners in developed countries.

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# 6

## Economic and trade barriers to climate change adaptation

### Namibia country study

*Laudika Kandjinga, Jessica Smith and Juliane Zeidler*

#### Introduction

Namibia is predicted to be highly vulnerable to climate change impacts, as many of the country's key sectors are vulnerable and sensitive to climate change. Adaptation is a high priority if there is any chance of meeting national development vision and plans, as well as other internationally agreed targets, such as the Millennium Development Goals (MDGs). However, unlike the global public nature of climate change mitigation, adaptation is a costly policy challenge specific to each individual country. Having gained little of the benefit from contributing to global climate change but bearing its costs, Namibia, like other Southern African countries, finds it difficult to implement adaptation activities as a result of a number of barriers. This analysis considers key barriers to adaptation in Namibia, including firstly economic, and secondly, trade barriers to adaptation. The chapter concludes with policy considerations to overcome these barriers and provides some potential opportunities that Namibia should take advantage of to carry adaptation forward.

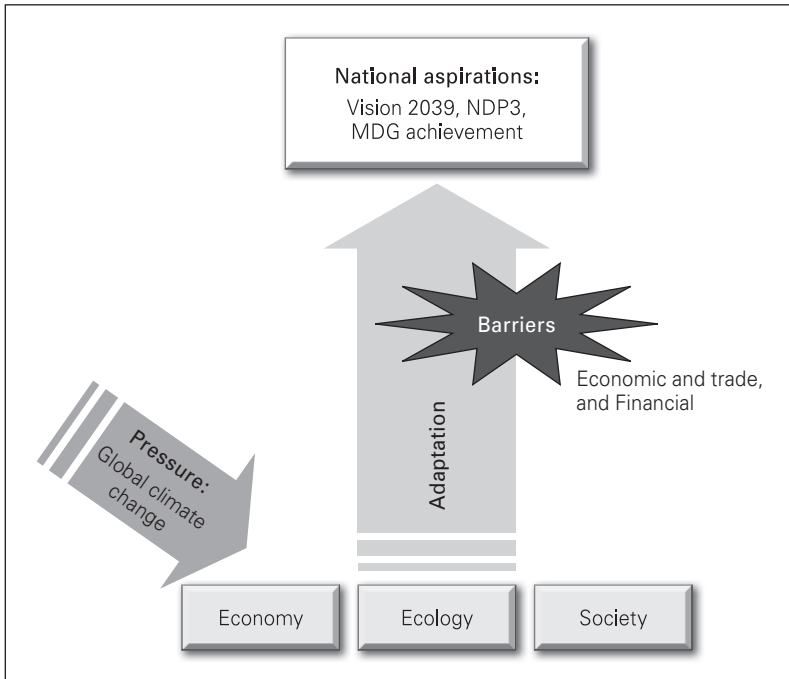
#### Impacts of Climate Change in Namibia

Climate change is one of the most significant threats to humankind, and Namibia is particularly vulnerable. The *Fourth assessment report* of the Intergovernmental Panel on Climate Change (IPCC) suggests

that African countries are most vulnerable, especially those which, like Namibia, are already arid to semi-arid.<sup>1</sup> Although climates across Africa have always been erratic, the continent is expected to face ever greater droughts, floods, rising sea levels, food insecurity, loss of biodiversity and depletion in the water supply. Namibia is a heavily liberalised and trade-dependent nation, and it is predicted that it will be highly vulnerable to climate change impacts, with many key sectors vulnerable and sensitive to climate change. Namibia has contributed little to global climate change, but is bearing its costs. Adaptation is a high priority if there is any chance of meeting the MDGs in Africa or elsewhere.

As a common global goal without profit for society, mitigation of greenhouse gas (GHG) emissions benefits the entire globe indiscriminately. However, adaptation is a costly policy challenge that is specifically related to each individual country. Namibia's Second National Communication (SNC) to the Conference of Parties of the United Nations Framework Convention on Climate Change is under way and it is delivered in accordance with Articles 4 and 12 of the Convention. The

**Figure 6.1 Conceptual framework of the analysis**





SNC and other national communications aim to provide information on the vulnerability of the country, actions taken to adapt and planned responses, and projections of climate change in Namibia.

## National Aspirations

Figure 6.1 provides a brief conceptual framework for the analysis in this Namibia country study.

Namibia's long-term development vision, known as Vision 2030, aspires to create a fully urbanised and industrialised population by 2030.<sup>2</sup> The National Development Plans (NDPs) are the cornerstone to facilitate the realisation of Vision 2030, with the third NDP (2007/2008–2011/2012) emphasising environment-based rural development to contribute to poverty reduction, rural development, growth and the reduction of inequalities. Development enables an economy to diversify and become less reliant on sectors such as agriculture that are more vulnerable to climate change effects. Besides that, more resources could be made available to minimise risks, promote development and for adaptation.<sup>3</sup>

## Adaptation and its Barriers

Namibia is fortunate to have a comprehensive assessment of recommended climate change adaptation measures. The aim of this chapter is not to duplicate these measures.<sup>4</sup> The focus here is on identifying and analysing the economic and trade barriers to adaptation.

### Economy

Although Namibia's long-term development vision is ambitious, current development indicators still classify Namibian citizens as largely subsistence-based and rural. Namibia has abundant natural resources and good infrastructure and access to markets. However, standing in contrast to this potential is the fact that the economy is not sufficiently diversified.<sup>5</sup>

Trade is a key factor in the economic development of any country, but particularly so for Namibia given its small domestic market and the composition of its economic activities. Most of Namibia's major sectors are export-oriented and based on natural-resource extraction; the agriculture sector also plays a major role in people's livelihoods. Namibia has a growing biodiversity-based sector (biotrade being

defined as the sustainable commercialisation of biodiversity products), which contributes at least 4,5 per cent directly to the Gross Domestic Product (GDP), a figure expected to grow to 7 per cent over 10 years.<sup>6</sup>

## Ecology

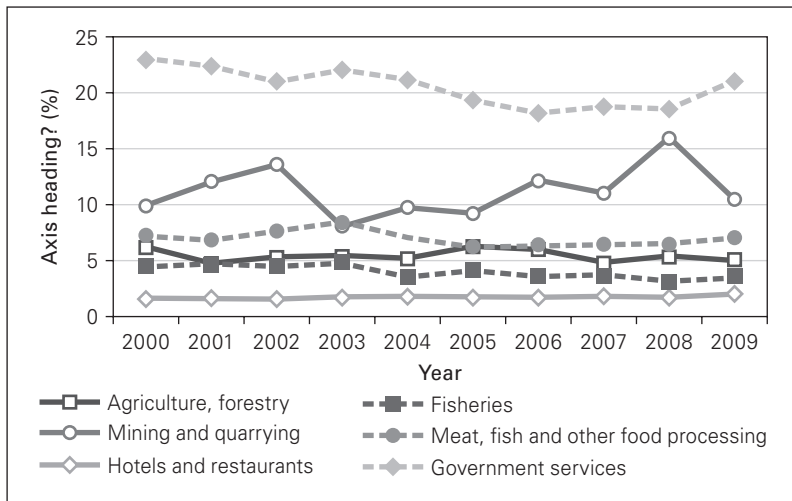
Namibia is the most arid country in Sub-Saharan Africa and one of the world's most sparsely populated countries. With naturally arid climatic conditions and environments, it is characterised by erratic rainfall.<sup>7</sup> Worldwide, Namibia is known for its remarkable variety of species, habitats and ecosystems, and recognised internationally as a biodiversity 'hotspot', one of just two arid-environment countries worldwide with this designation.<sup>8</sup> It was the world's first country to incorporate the protection of the environment into its constitution, at independence in 1990. Namibia's biodiversity is both a fundamental basis for livelihood generation and a national asset of significant global value.<sup>9</sup>

## Namibia's Trade and Economy at a Glance

Namibia's unique and relatively pristine natural environment is one of its key strengths.<sup>10</sup> The country has abundant natural resources, good infrastructure and access to markets. Economic activities are concentrated in primary-sector activities, namely the extraction and processing of minerals for export, which accounts for 20 per cent of GDP, large-scale commercial livestock farming and fishing.<sup>11</sup> These activities mean the economy is highly vulnerable to world market price fluctuations, especially for products such as diamonds.

Namibia's GDP was NAD 11,2 billion in 2009 and has grown on average by 4 per cent annually since 1990.<sup>12</sup> Figure 6.2 shows certain sectors and their contribution to GDP, including fisheries, agriculture, meat/fish processing, tourism (i.e. hotels and restaurants), mining and government services. In line with the global economic recovery, there has been a sign of continuing improvement in the first quarter of 2010, although they are recovering slowly. Namibia's economy has become more diversified, and therefore better able to cope with shocks.<sup>13</sup>

Namibia is classified as a lower-middle-income state, with an average per capita income of around US\$2 800, although there remains a sizeable gap between a wealthy minority and a poor majority. Indeed, Namibia is one of the most unequal countries in the world with huge income disparities – the Gini coefficient is around 0,6.<sup>14</sup> This is reflected in the

**Figure 6.2 Contribution of selected sectors to Namibia's GDP, 2000–2009**

Source CBS/NPC. 2010. *Preliminary National Accounts 2009*. Retrieved 9 September 2010. Available at: [http://www.cbs.gov.na/pub/natacc/National\\_Accounts\\_2000-2009.pdf](http://www.cbs.gov.na/pub/natacc/National_Accounts_2000-2009.pdf) [Accessed 17 July 2011].

distribution of wealth as well as access to services and resources.<sup>15</sup> The Household Income and Expenditure Survey of 2003/04 indicated that 48 per cent of rural households (i.e. 106 145) obtain their main source of income from subsistence farming or natural resources that are rain-fed, and therefore sensitive to climate variability. Poverty remains a challenge largely for the rural communities. Unemployment is a major cause of poverty. It increased to 51,2 per cent in 2008.<sup>16</sup> Poverty is most widespread and severe in the largely rural communal regions of the north and north-east.<sup>17</sup> These are regions characterised as mostly rural areas; the majority of Namibians live in such regions. However, there have been various efforts to combat poverty and inequality through affirmative action, black economic empowerment, the Rural Poverty Reduction Programme and other approaches.

Namibia is a trade-dependent country. The exports of goods and services averaged 48 per cent of GDP and imports 53 per cent in the period 2001–2005.<sup>18</sup> The country's economy has been more closely tied to that of South Africa than any other Southern African country, and government finances remain highly dependent on revenues from the Southern African Customs Union (SACU).<sup>19</sup> Namibia has a high degree of economic integration with the rest of the African continent, being a member of the SACU,<sup>20</sup> which aims at ensuring free

movement of goods among the member states, as well as the Southern African Development Community (SADC), and the Common Market for Eastern and Southern Africa. These initiatives are aimed at facilitating regional trade by removing trade barriers across member states. Namibia is a member of the Cotonou Agreement and the World Trade Organization (WTO), and has signed some of the bilateral preferential trade agreements, including the African Growth and Opportunity Act and the Economic Partnership Agreement with Europe.

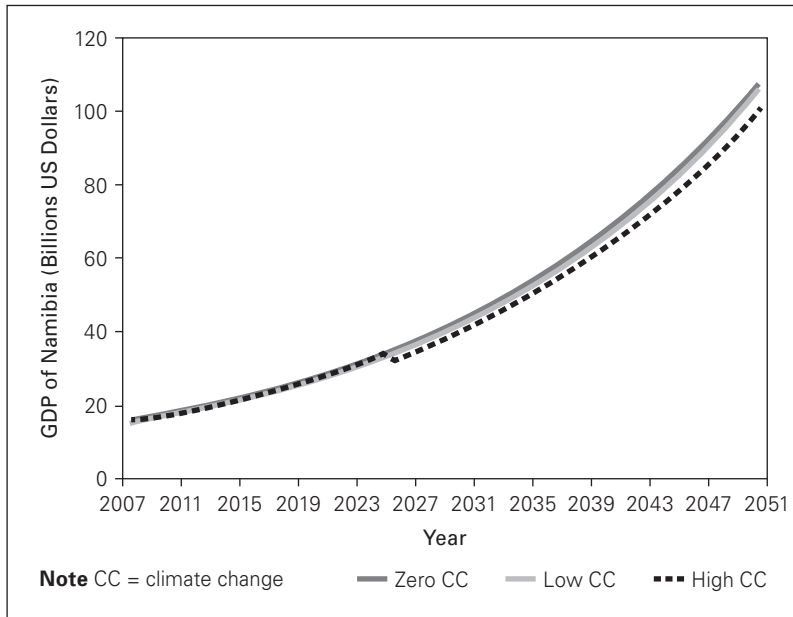
## **Climate Change Impacts and Existing Adaptation Efforts**

### **Impacts and risks**

Climate change presents a challenge unprecedented in human history. It threatens food security, economies and lives of people worldwide.<sup>21</sup> Climate change will exacerbate existing challenges relating to water resources resulting from population growth, and economic and land-use change, including urbanisation.<sup>22</sup> Climate change scenarios indicate a future warming level of 0,2–0,5 °C per decade across Africa.<sup>23</sup> The issues of food scarcity and unbalanced land distribution make the African continent particularly vulnerable. Countries with lower adaptive capacity, lack of – or limited resources, and high levels of poverty are mostly likely to be affected by climate change.<sup>24</sup> Climatic variability is already a common phenomenon in Namibia, with persistent droughts and unpredictable and variable rainfall and temperatures being the norm.<sup>25</sup> The lack of water is a key constraint to Namibia's development due to the aridity that prevails. It is predicted with a high degree of confidence that even without climate change, the country will face absolute water scarcity by 2020. Climate change only compounds this situation.<sup>26</sup> In addition, it has been predicted with a high degree of certainty, that Namibia will become hotter through the years, with an expected increase in temperatures of between 1 °C and 3, 5 °C in summer and 1 °C and 4 °C in winter in the period 2046–2065.<sup>27</sup>

The country is characterised by different eco-regions, namely tropical, semi-arid and desert, and the challenges posed by climate change will vary greatly from region to region.<sup>28</sup> The government of Namibia has, therefore, identified seven sectors as vulnerable to climate change: water resources, marine resources, agriculture, biodiversity ecosystems (tourism), coastal zones, health and energy.<sup>29</sup> Other projections for Namibia

**Figure 6.3 Projected Namibian GDP under three climate change impact scenarios, 2007–2050**



**Source** Reid, H., Sahlen, L., Stage, J. and MacGregor, J., 2007. *The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy*. Environmental Economics Programme Discussion Paper 07-02. London: International Institute for Environment and Development. p.iii.

and the Southern African region suggest significant vulnerability to the impacts of climate change because its economy is highly dependent on climate-sensitive, rain-fed, resource-based sectors such as agriculture and fisheries.<sup>30</sup>

Namibia has a high level of direct dependency on natural resources. Approximately 30 per cent of its GDP is generated from environmental resources.<sup>31</sup> The annual losses to the Namibian economy could be up to 6 per cent of GDP from the impact that climate change will have on its natural resources alone over 20 years, and this figure only takes into account agriculture and fisheries.<sup>32</sup> Modelling tools used to demonstrate the impact of three climate change scenarios on GDP reveal higher economic losses with greater climate change intensity (see Fig 6.3).

In the analysis of the impacts of climate change on agriculture, fishing and forestry, Reid et al. disaggregated national estimates of climate impact by sector (see Table 6.1). Given the limited available data and methodological challenges, this should be considered as an indicative

**Table 6.1 Overview of climate change effects on GDP per sector, importance**

| Values                         | GDP contribution (approx %) | Changes expected due to climate change                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Level of importance                                                                                                                                                                                                                                                                                                                                                                                                                   | Effect on GDP (millions N\$ per year) | Confidence in range of change |
|--------------------------------|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------|
| Use values/economic subsectors |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                       |                               |
| Cereal production              | 0,5                         | Decrease (10–20%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <ul style="list-style-type: none"> <li>About 40% of all Namibia's exports are based on agricultural products.</li> <li>Agricultural sector employed 102 636 people during 2004, which constitutes 27% of the country's active workforce.</li> <li>Livestock production is the main activity in Namibia's agricultural sector, accounting for approximately 85% of agricultural income and, on average, close to 9% of GNP.</li> </ul> | –16 to –32                            | Low to medium                 |
| Crop production                | 1,0                         | Decrease (10–20%)<br>Crop production would no longer be viable, as the climate gets hotter resulting in high evaporation rate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                       | –32 to –65                            | Low to medium                 |
| Livestock production           | 4,0                         | Decrease (20–50%)<br>Aridity is expected to escalate grazing stress and vegetation deteriorations, resulting in reduction in livestock productivity and crop yield could mean agriculture will be severe affected.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                       | –264 to –660                          | Medium                        |
| Traditional agriculture        | 1,5                         | Decrease (40–80%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                       | –197 to –395                          | Medium to high                |
| Fishing                        | 6,0                         | Increase (30%)/decrease (50%) <ul style="list-style-type: none"> <li>Changes in water temperature (warming sea temperature) and precipitation affect the dynamics of ocean currents. These changes affect fisheries by changing habitat availability or quality (Damper and Mbirimi, 2010).</li> <li>Sea level rise, extremes of nutrient enrichment (eutrophication) and invasive species, extinction, and the frequency and severity of Benguela Niño events is increased causing an overall decrease in average productivity.</li> <li>Inland aquaculture could be affected or flooded by floodwater, and fish could die due to contamination of water.</li> </ul> | Namibia has one of the most productive fishing grounds in the world. In recent years it has faced decline, but is currently regarded as a potential future growth sector in Namibia and contribution to GDP still stands around 7%.                                                                                                                                                                                                   | –0 to –990                            | Low                           |

| Values             | GDP contribution (approx %) | Changes expected due to climate change                                                                                                                                       | Level of importance                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Effect on GDP (millions N\$ per year) | Confidence in range of change |
|--------------------|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------|
| Tourism            | 2-3                         | <b>Increase/Decrease</b><br>Loss of species and shift in distribution, productivity of species and stressing existing ecosystems.                                            | <ul style="list-style-type: none"> <li>One of the fastest growing sectors within Namibian economy.</li> <li>Contribution to the total GDP (19.9%), and to total employment (about 7.4%) in 2011<sup>1</sup></li> </ul>                                                                                                                                                                                                                                                 | -                                     | Low                           |
| Forests            | +                           | <b>Unchanged</b><br>Drought, insects, pathogens outbreaks are likely to increase in severity, thus this can change forest ecosystem and shift in response to climate change. | <ul style="list-style-type: none"> <li>Forestry resources have a variety of uses such as, for energy (in form of charcoal, firewood), timber (poles and posts in the rural areas), industrial wood in the form of raw materials for pit sawing and sawmilling and wood carvings and craft.</li> <li>Value in terms of the gross output is NAD 1.2 billion, making a direct contribution to the GNP of NAD 1 billion or some 3% of GNP (Barnes et al., 2004)</li> </ul> | 0                                     | Low                           |
| Non-use-value      | +                           | Decrease                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                                     | Low                           |
| <b>Total value</b> |                             |                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>-509 to -2142</b>                  | <b>Low</b>                    |

Note: \* = not included in the traditional national accounts.

Sources Reid, H., Sahlen, L., Stage, J. and MacGregor, J., 2007. *The economic impact of climate change in Namibia: How climate change will affect the contribution of Namibia's natural resources to its economy*. Environmental Economics Programme Discussion Paper 07-02. London: International Institute for Environment and Development; Zeidler, 2007. *Namibian national issues report on land use, land use change and forestry (LULUCF) (Adaptation)*. Windhoek: United Nations Development Programme; UNAM, 2008. *Research on farming systems' change to enable adaptation to climate change*. Windhoek: Ministry of Environment and Tourism; Dirxx et al., 2008. *Climate change vulnerability and adaptation assessment*; Kadikwa and Ndaiikokule, 2007; Toto, A. and Thälwitzer, S., 2009. *EU sanitary demands for red meat trade: Impact on sustainable development in Namibia*. Windhoek: International Institute for Sustainable Development. Available at: [http://www.iisd.org/kn/pdf/rea\\_namibia\\_red\\_meat.pdf](http://www.iisd.org/kn/pdf/rea_namibia_red_meat.pdf) [Accessed 12 May August 2011]; FAO, 2007. *The Republic of Namibia*. Available at: <http://www.fao.org/floldsite/FCP/en/NAM/profile.html> [Accessed 16 June 2011]; WTTCC, 2011. *Key facts at a glance*. Available [http://www.wttcc.org/eng/Tourism\\_Research/Economic\\_Research/Country\\_Reports/Namibia/](http://www.wttcc.org/eng/Tourism_Research/Economic_Research/Country_Reports/Namibia/) [Accessed 08 October 2011]; Capéco, J., Hoveka, E. and Heita, M., 2007. *Namibia energy review for the UNFCCC*. Windhoek: MET; Barnes, J.I., Nhulepo, O., Baker, A.C., Muteyauli, P.I. and Shigwedha, V. 2004. *Wildlife resource accounts for Namibia*. Windhoek: MET.

estimate with low confidence, but nevertheless a useful tool in terms of increasing the focus on the need for adaptation, and the appropriate policy approaches to achieve this.

Climate change could furthermore have more direct effects on the activity of trading itself. The Walvis Bay Corridor is a network mainly comprising the Port of Walvis Bay, the Trans-Kalahari Corridor, the Trans-Caprivi Corridor, the Trans-Kunene Corridor and the Trans-Oranje Corridor. These provide transportation routes for various goods between a number of Southern African countries, while other countries, such as Zambia and Zimbabwe, have already signed dry port agreements with the Namibian government. Climate change impacts, such as rising sea levels, may damage coastal infrastructure that supports trade and trade facilities close to ports.<sup>33</sup> This includes dry ports, harbours, roads, creation of new trade routes, rehabilitation of those facilities and infrastructure and destruction of infrastructure that is critical to trade.<sup>34</sup> Additionally, shifts in agriculture comparative which depend on the country's endowment of land and water resources, and increasingly on the size and quality of its agricultural establishment from all levels (farmers, public and private institutions) that serve the country.<sup>35</sup> This will mean that a country will not produce sufficient commodities that are best suited to the country's resource endowment, and raising national income could be affected, particularly trade dependent country such as Namibia. Extreme weather events (including increased flooding) can be expected to disrupt infrastructure, transport routes and markets, particularly in vulnerable areas.<sup>36</sup> This will have a severe impact on Namibia's trade.

## Existing efforts related to adaptation

The Namibian government has undertaken a number of projects and programmes aimed at fast-forwarding adaptation, particularly within local communities:

- The existence of the Clean Development Mechanism (CDM) and the establishment of a Climate Change Unit in the Directorate of Environmental Affairs, will allow Namibian projects to benefit from this transfer mechanism and offers a great opportunity for rural Namibia to engage in the use of biofuels, especially in the energy and transport sectors.<sup>37</sup> For instance, the Combating Bush Encroachment for Namibia's Development project, which aims



to generate electricity by utilising using invader bush, could be upscaled to other areas where bush encroachment is a problem.

- The existing Community Based Natural Resources Management (CBNRM) project provides opportunities for rural communities to diversify their income by forming common property resource management, known as conservancies.<sup>38</sup> To date, there are about 64 registered conservancies, according to the Namibian Association of Community-Based Natural Resource Management (NACSO).<sup>39</sup> Furthermore, CBNRM fosters the devolution of decision making to the local resource users, strengthens institutions on the ground and allows for better choices regarding resources than a centralised system of decision making. This change or shift from livestock to game farming in commercial farming reflects the realisation of the opportunity to harness the environmental and economic potential of the country's highly adapted wildlife.<sup>40</sup>
- The Millennium Challenge Account (MCA) Namibia Compact: the MCA provides grant funding for public investments in education, tourism and agriculture (livestock and indigenous natural stock). One of its objectives is to increase the productivity of agricultural and non-agricultural enterprises in rural areas. In so doing, it will contribute to adaptation and development simultaneously.
- The Africa Adaptation Programme (AAP NAM) builds a strong foundation for a national approach to adaptation. The project aims to build effective leadership and institutional frameworks in Namibia for better coordination and integration of climate change programmes into development policy. The project aims to strategically enhance the capacity of Namibians to respond to and be prepared for climate change. Besides that, the project will help the government identify financing options to meet long-term national adaptation costs and expand knowledge management. The project provides a good starting point for furthering adaptation across all the institutions in the country.

## Barriers to Adaptation

Adaptation is crucial to deal with the unavoidable impacts of climate change.<sup>41</sup> Adaptation cannot lessen the impacts of climate change, but it can mitigate the effects. Adaptation is defined as any adjustment in

natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits or harnesses beneficial opportunities.<sup>42</sup> Adaptation to climate change comprises numerous actions by households, firms, governments and civil society.<sup>43</sup> It also offers an opportunity to adjust economic activity, specifically in vulnerable sectors, supporting and contributing to the attainment of sustainable development. As such, economic development is perhaps the best hope for adaptation to climate change.<sup>44</sup>

To illustrate, some examples of adaptive measures in Namibia and other Southern African countries might include the following:<sup>45</sup>

■ **Agriculture:**

- Diversification of livelihood/income-generating activities and agricultural products.
- Management practices adapted to ensure critical growth stages are less impacted by harsh climatic conditions, such as mid-season droughts or temperature peaks.
- Modifying the length of the growing period and changing planting and harvesting dates.
- Use of irrigation, and soil- and water-conservation measures.
- Selection of indigenous breeds.

■ **Forests:**

- Value addition to forest and non-timber forest products.
- Substitution of energy sources.
- Diversifications of livelihoods and income-generating opportunities.

■ **Fisheries and fishing processing:**

- Investments in marine and inland aquaculture.

■ **Commerce and industry:**

- Climate-proofing screening on new investments; risk analysis.
- Investments in green infrastructure.
- Diversification away from vulnerable industries.

■ **Tourism:**

- Investments in wildlife and other arid-adapted tourism activities (such as community-based natural resource management).

Adaptation can be autonomous or planned.<sup>46</sup> Autonomous adaptation refers to actions taken by individuals, households and businesses without public intervention. Mostly, this takes the form of a response to already apparent climate impacts mainly at the local level, defined by

the extent to which private actors are able to reduce negative impacts from climate change and the related costs. Planned adaptation, or policy intervention, is associated with public actors and refers to adaptation measures that result from decisions made at policy-making level. This kind of adaptation is prepared before climate change impacts are experienced by the end-users.<sup>47</sup>

Adaptation measures and strategies can be based on, and implemented in response to, both previous (observed) and projected (anticipated) climate change impacts. Therefore, in planning for these observed and anticipated impacts of climate change it is important that adaptation efforts rest on a sound economic basis.<sup>48</sup> Adaptation is not an easy or cost-free option because it often involves the residual damages of climate change. Therefore adaptation itself will bear a cost.<sup>49</sup> However, adaptation costs, investments and benefits will be influenced by the uncertainty of the specific effects of climate change in a given area.<sup>50</sup> The emerging argument about adaptation is that it can be simple and free. However, this depends on the form of adaptation. Awareness raising and sensitising local communities about possible adaptation measures are some of the forms that contribute to adaptation awareness. Nevertheless, the implementation of such adaptation measures definitely comes with a cost.

Adapting to climate change has its limits and obstacles – or barriers to implementation. These barriers can occur when proposed measures are not technically feasible, when they are not socially accepted, when their effectiveness has not been demonstrated, when they are not economically viable, when institutional capacity or human skills are lacking, when measures are not compatible with existing policies, and when transboundary issues are involved.<sup>51</sup> In terms of economic viability, it is important that the adaptation projects and programmes should at least be effective in terms of helping local communities obtain income and improve their livelihoods.

Barriers to climate change adaptation occur at national, regional and international levels. Namibia faces many barriers. However, for the purposes of this chapter the focus is on two levels of economic barriers to adaptation: global and national (summarised in Table 6.2).

Economic and financial resources are the cornerstones of adaptation,<sup>52</sup> and in the case of Namibia, are strongly underpinned by trade. Despite this, economic development is not the only variable that influences adaptive capacity. Adaptation is not automatic in the presence of financial resources, as it also depends on other pillars of adaptive

**Table 6.2 Overview of economic and trade barriers to adaptation in Namibia**

| Category           | Levels of adaptation barriers                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Economic and trade | <p><b>Global level:</b></p> <ul style="list-style-type: none"> <li>■ Carbon-labelling schemes and standards; other major non-tariff barriers to trade</li> </ul> <p><b>National level:</b></p> <ul style="list-style-type: none"> <li>■ Inappropriate measures in bilateral investment treaties can restrict freedom to impose pro-climate requirements on international investors and can constrain national technological innovation (as was the case with solar panels and Spanish investment)</li> <li>■ Appropriate government policies necessary for providing the regulatory environment and stability for promoting investment in adaptation measures</li> <li>■ Access to the international carbon market (voluntary markets as well as stock exchanges)</li> </ul> |

**Sources** Dirxx et al., 2008. *Climate change vulnerability and adaptation assessment*. Prepared for the Ministry of Environment and Tourism. Windhoek: Ministry of Environment and Tourism; Zeidler, J., 2007. *Namibian national issues report on land use, land use change and forestry (LULUCF) (Adaptation)*. Windhoek: United Nations Development Programme; Broucke, G., Morton, T. and Claassen, P., 2005. *Assessment of technology needs for mitigation and adaptation to climate change in Namibia*. UNFCCC; Zeidler, J., 2005. *Namibian National Capacity Self-Assessment for Global Environmental Management: Final NCSA report*. Windhoek: Ministry of Environment and Tourism (authors' own assessment).

support. However, the spending capacity of the population is an important factor to be considered in analysing the cost of access and means of adaptation.<sup>53</sup>

## Economic barriers

Economic barriers to adaptation consist of the state's economic structure, microeconomics and fiscal policies. The state's economic structure depends mainly on the sectoral allocation of resources and the production, distribution and transport systems, which are determined by the infrastructure and consumption patterns. Economic barriers are discussed in the following sections.

### *Low economic diversification*

Lack of economic diversification can be regarded as barrier, since most rural communities in Namibia rely on natural resources (e.g. rain-fed crops).<sup>54</sup> Some communities' livelihoods depend on craft making, and this means that they will have no other sources of income, as cutting down trees is not in line with sustainable development and MDG 7 – ensuring environmental sustainability.

### ***Uncertainties of adaptation costs***

Uncertainties about climate change in general are an obstacle, but pricing and the opportunity cost of investments in adaptation stand out as particular examples. It is still difficult to estimate precisely the adaptation cost or future pricing of adaptation efforts.<sup>55</sup> More generally, it is difficult to predict where climate change will take place and what will be the effects, alongside all of the other potential changes that can take place in a generation or more.

It is difficult to precisely estimate the adaptation cost or future pricing of adaptation projects. Uncertainties have been hindering adaptation in Namibia. However, the government has recognised that determining adaptation cost for a specific period is critical.

The recent study for Namibia by Investment and Financial Flows (I & FF), completed in March 2001, revealed that over the next 25 years Namibia will require some \$4,05 billion (N\$30 billion) for the implementation of priority climate change mitigation and adaptation measures in the energy and agriculture sectors. The I & FF assessment was conducted to determine the country's current and future financial requirements to address the impact of climate change and to support long-term capacity enhancement in climate change planning and decision making in the public sector. The report focused on mitigation specifically in the energy sector (i.e. reducing emissions of GHGs) and adaptation to climate change impacts in land use, land use change and forestry (LULUCF), which focused on the agriculture sector.<sup>56</sup> The report further revealed that about two-thirds of the funds are needed for adaptation measures to improve livestock production. It is important to note that these are just estimates – the exact funds needed for adaptation in Namibia's agriculture and energy sectors should not be confined to these estimates, as we do not yet know precisely what the full impacts of climate change will be.

### ***Affordability***

Innovative agricultural technologies are not within the reach of most farmers because of the cost. Technologies are available that can reduce the amount of time spent cultivating the fields. Most communities cannot afford access to advanced technologies, such as drought-resistant seeds and technology and machinery for cultivation. For instance, although farmers are interested in using conservation tillage, not all of them are able to afford the technologies and equipment involved. Besides agricultural technologies, in some remote areas where water is

a major issue, communities have no means to harvest rainwater, particularly from rooftops.

### ***Awareness and knowledge***

Lack of knowledge and skills may lead to lack of awareness of the best available technologies.<sup>57</sup> This has a potential to cause uninformed decisions be made regarding appropriate technology to invest in as part of adaptation efforts<sup>58</sup>. For instance, the national, regional and local level assessments under the National Capacity Self-Assessment (NCSA) for Global Environmental Management revealed that the overall awareness and understanding of climate change was relatively low, especially at the local and regional levels.<sup>59</sup> Sometimes technology capabilities in the country of destination may have opposite effects, as it may hinder development. The transfer of most complex technologies is impeded by low technological capacities, which means that the country cannot take advantage of complex technologies that may yield desired results. Previously, lack of human resources hindered estimates of adaptation costs, leading to uninformed decisions, and the costs of those decisions (e.g. land use and infrastructure) are now evident, particularly in the northern-central part of Namibia.

### ***Lack of climate-proofing investments***

Screening of new investments (foreign investments) may require potential investments to have a neutral carbon footprint or to use only clean energy and technologies, such as the CDM, which is included in the Kyoto Protocol.

## **Trade barriers**

Trade is an important component of economic development for any country, particularly those that are trade-dependent, such as Namibia. However there are certain barriers, local, regional and international, that hinder free and fair trade. The relevant trade barriers that have implications for adaptation in Namibia are discussed in the following sections.

### ***Regional liberalisation***

There have been economic changes in SADC, with many countries in the region making significant progress in promoting international and regional trade, and opening their doors to foreign investment.<sup>60</sup> Namibia

was once a leader in liberalisation; it now faces even greater competition from its neighbours. Trade liberalisation is a real threat to agricultural development and trade in developing countries, particularly in the agriculture sector.<sup>61</sup> Developing countries have recognised that providing substantial support to farmers is critical because on the whole agricultural trade favours developed countries.

### ***SPS measures***

Sanitary and phytosanitary (SPS)<sup>62</sup> measures can be regarded as barriers, since they are primarily shaped by the developed world to suit their economic and other conditions.<sup>63</sup> Strict standards and regulations concerning the production and hygiene requirements of potential markets, such as the EU requirements, are largely enforced under Namibia's animal health legislation, the Animal Diseases and Parasite Act (No. 13 of 1956). The northern regions of Namibia have a large livestock population. However, this area faces formidable obstacles in developing export-oriented livestock production due to international sanitary standards and poor-quality rangelands.<sup>64</sup> Specific regulations on animal identification, registration and traceability were published recently in order to harmonise with EU red-meat traceability policies.<sup>65</sup>

### ***Eco-labels and eco-certification***

In addition to standards, eco-labelling and eco-certification present at the same time opportunities and threats to Namibia as far as trade is concerned.<sup>66</sup> The procedures for green labelling, testing, certification and fair-trade schemes are often complex and expensive, and the local market for certification services is very small and fragmented. This impacts on the costs for producers. A study conducted in Namibia in 2009 found that there is a lack of economic incentives for local industries to adopt certification schemes and labelling. It further revealed that there is a lack of economic incentive schemes for local industries to adopt green labelling and certification schemes, and that the implementation of standards developed for certification are slow and expensive for the local industry.<sup>67</sup> Most certifiers are located outside Namibia away from the producers, resulting in accessibility issues.

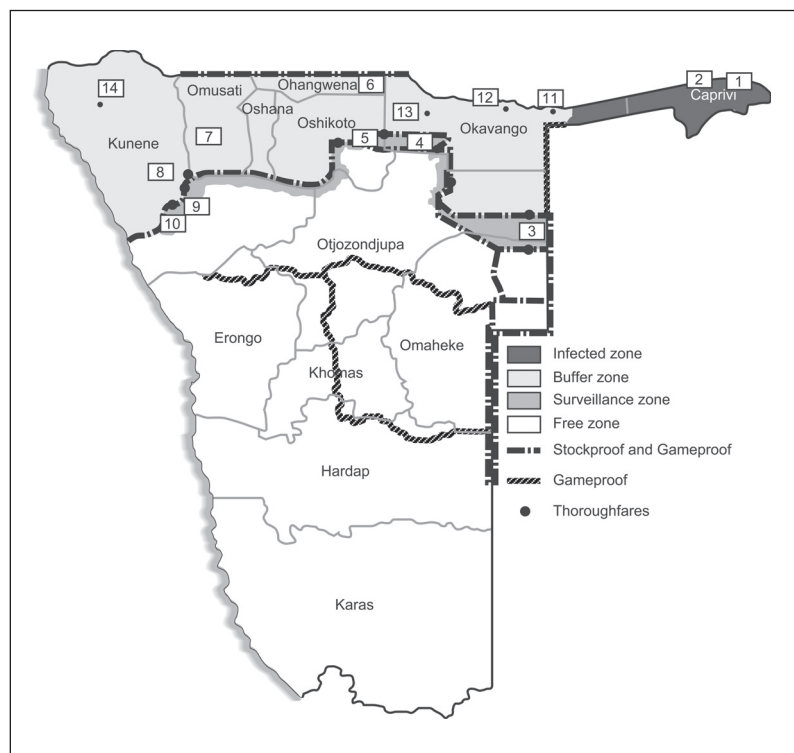
Lack of institutional support to help certified producers to access niche markets has also been noted. Fair trade is a worldwide movement that strives to improve the terms of trade between producers and consumers.<sup>68</sup> This has constrained the local communities from marketing their unfinished products and their range of products. Considering that

Namibia, like most developing countries, is largely a taker rather than a maker of standards, the danger is that a proliferation of green labels and eco-certification schemes will impose additional assessment and certification costs on local producers, create confusion and have a detrimental effect on trade.<sup>69</sup>

### Historical legacy

In Namibia, the legacies of colonialism, occupation and apartheid are significant barriers to overcome. Among others, the Veterinary Cordon Fence (VCF), known as the ‘red line’ (see Figure 6.4), prevented the movement of people. The VCF was part of the apartheid regime’s control over population and marginal land. The white people controlled the productive farming areas, all linked today to the infrastructure

### Map 6.1 Foot and mouth disease management zone



**Source** Toto, A. and Thalwitzer, S., 2009. *EU sanitary demands for red meat trade: Impact on sustainable development in Namibia*. Winnipeg: International Institute for Sustainable Development. Available at: [http://www.iisd.org/tkn/pdf/rtea\\_namibia\\_red\\_meat.pdf](http://www.iisd.org/tkn/pdf/rtea_namibia_red_meat.pdf) [Accessed 12 August 2011].



available in different parts of the country, perpetuating inequalities between commercial and communal farmers.

The controversial VCF, used initially to segregate African from European farmers and their herds, continues to impact on rural communities in northern regions (Oshana, Omusati, Oshikoto, Kunene, Ohangwena, Caprivi and Kavango), yet this region has the potential to make substantial contributions towards poverty alleviation, national food security, thereby creating wealth for livestock keepers and contributing to the country's GDP.<sup>70</sup>

It is in these regions that most of the country's population is concentrated and rural farming, although the continued inadequacy of veterinary services north of the VCF has made it impossible for rural communities to benefit from marketing their livestock, as animals in those areas are not regarded as being free of foot and mouth disease. However, there have been efforts by the government to make the situation more favourable for all, particularly communal farmers. One such effort is the trade agreement between Namibia and the Democratic Republic of Congo to allow for trade in livestock. This agreement aims to promote the export of beef originating from the northern-central areas and northern communal areas, which are currently excluded from marketing their meat as a result of EU and WTO requirements.<sup>71</sup>

### ***Non-tariff barriers to trade***

Lack of markets or not having access to markets adds further constraints to farmers' ability to trade their products. The willingness may be there, but many rural farmers are denied access to markets because of the standards and measures imposed by developed countries. These include quotas, labelling conditions, import bans, granting of licences and intellectual property rights. Intellectual property rights hamper the transfer of technology, thus acting as a barrier of access to technology, particularly emerging climate-related technologies.<sup>72</sup> Intellectual property rights as far as the transfer of climate-related technologies is concerned remains unclear, and further studies are needed to assess impediments to transfer.<sup>73</sup>

### ***Quota share***

A quota is simply a maximum limitation, specified in either value or physical units, on imports of a product for a given period. For instance, the Ministry of Fisheries and Marine Resources allocates quotas to fishing companies that have paid licence fees in Namibia. This means that they

are limited in the specific quantity of fish and types of fish. Quotas are critical in that they enable sustainable utilisation of resources (e.g. fish and marine resources) and allow for recovery of the fisheries. On the other hand, they contribute to unemployment income restraints once a company reaches its allocated quota. Besides income loss, companies are at risk of losing external markets and it is often difficult to establish and re-establish the market niche elsewhere. In addition, there has been an argument by local companies that only foreign companies are allocated fishing rights and this is due to competition and licence fees, which most local and emerging fishing companies are unable to pay.

### ***Tariff escalation***

Tariff escalation occurs when the tariff applied to a product category rises as the level of processing increases, from raw material to finished product. Tariff escalation is more common in agricultural commodity chains (hides and skins, meat and fish), and is regarded as one of the largest factors to hinder export growth, diversification and sustainable development.<sup>74</sup> In general, it is argued that high tariffs that are normally paid at borders on imported goods could also impede the entry of efficient technologies and agricultural goods. An increase in the price of maize meal, wheat flour and pasta in March 2011 was attributed to political instability in the Middle East and climatic disasters elsewhere, such as droughts in certain countries, including Russia, and an increase in fuel prices.

## **Future Opportunities**

The reality of living in a variable climate, with the pressures of a changing climate and certainly increasing variability in climate, poses many challenges in Namibia. However, there are opportunities too:<sup>75</sup>

- The draft Namibia National Policy on Climate Change aims to provide a framework for development, implementation, monitoring and evaluation of climate change mitigation and adaptation activities. It aims to enhance the synergies among sectors and stakeholders for effective and efficient mitigation and adaptation responses to climate change impacts. In the context of resources to enable adaptation, the policy will provide the legal basis for resource mobilisation to address climate change adaptation and mitigation.<sup>76</sup>

- Mainstreaming adaptation within sustainable development and economic development activities. The NDPs are key to facilitating national development, such as Vision 2030; as such, the NDPs will be in a better position to integrate climate change.
- Ongoing decentralisation offers possibilities of integrating adaptation at a local level. This process will ensure that funding for some adaptation will be secure and through allocation of resources (from national and external sources) to regional offices and agencies, adaptation priorities will be determined. It would also ensure that adaptation is addressed as a development issue, bearing in mind that adaptation and development are two sides of the same coin. This means that adaptation will not be seen as one dimension of environmental challenges, and hence will leverage more resources.
- Mid-term evaluation and review of the projects under way in the country could also help reduce vulnerabilities.
- Some of the existing private-sector initiatives, such as that of the Namibia Organic Association, to set local eco-labels and explore possibilities for creating and adopting national eco-labels could be supported to increase their effectiveness through, for example, the National Standard Institution or Team Namibia.<sup>77</sup> Some of these are already recognised brand names.
- Namibia is rich in heritage, and it is important to make use of indigenous and scientific knowledge, and fully explore existing knowledge regarding local successes in dealing with harsh conditions, changes and variability where appropriate.
- Coordination of synergies among the programmes operated by private and public institutions should be identified and encouraged to avoid duplication and avoid wasting resources.

## Conclusion and Policy Considerations

Namibia is highly vulnerable to the adverse effects of climate change. The country's vulnerability is compounded by a number of factors, including its dependence on natural resources, socio-economic constraints and its semi-arid environment, which is projected to be hit hardest by climate change. Namibia has low adaptive capacity in terms of financial and economic resources, and lack of technology and knowledge.

Adaptation is possible. However, the great concern for adaptation is the limits or obstacles faced and how they can be overcome. This

chapter reviewed two key types of barriers to adaptation: economic and trade barriers. Adaptation will require considerable resources, which are often not within the reach of most institutions and individuals – or the state as a whole. Adaptation has been regarded as another part of development so there is a need for adaptation to be mainstreamed into poverty-reduction strategies and other developmental programmes to be more effective and to leverage greater financial resources, thus overcoming these economic and trade barriers.

Donors and international organisations need to continue providing incentives to governments to take adaptation forward by overcoming the economic and trade barriers. In the same vein, effective adaptation depends on the knowledge and awareness of climate change risks. To enable efficacy in adaptation measures undertaken, there is a need to remove these barriers.

The following policy considerations target national government, local institutions and other SADC countries as a matter of urgency in order to help make the current situation more favourable for local communities to adapt to climate change.

### **Awareness and knowledge**

- A concerted effort is needed to increase awareness, education and empowerment in order to help local communities to adapt. Agriculture extension personnel play an important role in agro-nomic activities and act as a two-way channel between the government and grass-roots level. Various resources and funds could be sourced to enable adaptation. There is a need to ensure the sustainability of projects and programmes, particularly the AAP NAM.
- It is important to provide information and technical support to emerging small producers in terms of the benefit of certification of their products, and threats and potential negative impacts in terms of trade barriers.

### **Investing in climate-friendly and innovative agricultural technologies**

- Investment in climate-friendly technology (i.e. technology transfer) will help Namibia to adapt. This should be accompanied by a strong capacity-building component. Government and other donor organisations should introduce voluntary adaptive behaviour

through provision of suitable incentives to local organisations, individuals and business fraternities.

- Improving and accelerating the transfer of technology will contribute to overall economic growth, as this will help promote both sustainability and adaptive capacity, and, therefore, poverty reduction.
- Investment in breeding- and seed-technology programmes should be considered by the Ministry of Agriculture, Water and Forestry. There is an urgent need to encourage the utilisation of indigenous and locally adapted crops and animals, and crop varieties that are adapted or resistant to harsh conditions.

### **Mainstreaming climate change adaptation into national development planning, policies and goals**

- Adaptation can be a mechanism for development. Therefore, it should be mainstreamed into poverty-reduction strategies of the National Planning Commission and other developmental programmes to leverage greater financial and economic resources.
- Some of the existing policies (agriculture – Green Scheme Policy, Water Policy and Forest Act, and policy – the Environmental Management Act) need to incorporate climate change issues (integration, or mainstreaming), as opposed to enacting more policies and laws on climate change. This will help achieve comprehensive policies and avoid duplication of and conflicts in institutions' mandates.
- Namibia's climate is conducive to the establishment of institutions; as such, there is a need to encourage producers to form cooperatives or otherwise pool resources for certification.<sup>78</sup> It is critical that procedures should be established to facilitate the accreditation of local certifiers where appropriate to reduce the costs of the certification process and consequently speed up the process and enable local products to be marketed elsewhere.
- Existing policies, experiences and programmes should be used for the development of national policies, such as economic-development policies (including Vision 2030) that promote income diversification, niche marketing, economic empowerment and cooperative development.<sup>79</sup> The NDPs and other developmental plans should address climate change adaptation, as these are the instruments that enable the country to become fully industrialised and urbanised.

## **Institutional and legal framework**

- The existing policies should enable adaptation activities to be taken forward. Unfortunately, policy implementation is only possible when the current institutional structure, particularly those mandated, fast-forward their implementation and provide support for adaptation in fulfilment of their mandates. The Environmental Management Act (No. 7 of 2007) is not yet fully implemented, although it was promulgated in 2007, owing to regulations that are not yet completed. Another example is the Namibia National Policy on Climate Change, which is taking long to finalise.
- The next NDPs should at least place more emphasis on integrated climate change issues, as climate change is a threat to development in general and to Vision 2030 in particular. Integrating climate change into planning will enable Namibia to be aware of the issues and to come up with measures aimed at reducing the full cost of the impacts of climate change.

## **Promotion of partnership, networking (coordination, collaboration and communication) and synergies**

- There is a need to strengthen and encourage collaboration, coordination and communication among the government institutions and all other institutions that are concerned with climate change.
- There is a need to enhance synergies because most measures for adaptation also apply to sustainable development and national development. This will ensure more collaboration towards cost-effectiveness and, more importantly, reduce costs of implementation by sharing resources.
- Existing programmes and activities should be used to synergise climate change-related activities.

## **Harmonising domestic regulations with international standards and requirements**

- There is a need to harmonise domestic regulations, such as Namibia's animal health policies and the EU's sanitary requirements for the import of red meat, so that many Namibian communities, especially previously disadvantaged groups and those that are on the north of the VCF, can market their meat.

- Removal of limits/obstacles (barriers) to international trade will improve market conditions, reducing exploitation of marginal land and avoiding land degradation.
- Foreign investors and donor projects and programmes should aim at promoting reforestation and improving land-use practices, especially in degraded and deforested areas, in order to increase productivity, stimulate ecosystem services and at the same store more carbon and reduce emissions.<sup>80</sup>

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# Financial barriers to the implementation of climate change adaptation measures

*Bongani Motsa*

## Introduction

The changes in climatic patterns not only threaten the entire livelihoods of people in developing countries, but may also have caught developing countries' governments off guard. The impact of climate change is felt most by developing countries, not just because they are ill-prepared, but more fundamentally because of a lack of adequate resources needed to put in place measures to protect communities from the adverse effects of climate change. Although we cannot reverse the impact of climate change, people can protect themselves through what climate experts refer to as adaptation, or putting in place measures to mitigate its ill effects in future. Very few developing countries can raise the resources required for adaptation and mitigation of climate change. Some developing countries are sceptical of using national resources for climate change, as they hold the view that developed countries are solely responsible for the worsening climatic conditions. Article 3 of the United Nations Framework Convention on Climate Change (UNFCCC) notes that the parties should protect the climate system for the benefit of future and present generations on the basis of equity and in accordance with their common but differentiated responsibility and respective capabilities. This effectively means developed countries should take the lead in developing systems and processes to fight climate change and its adverse effects.

Climate change adaptation requires enormous resources for implementation. For developing countries, characterised by a significant proportion of the population living on subsistence farming, climate change adaptation is a major challenge. In addition, adverse changes in the weather patterns will exacerbate existing poverty levels. Businesses in developing countries are confronted with the challenges of international competition arising from globalisation, while governments have a thin tax base. This makes raising resources for climate change adaptation by the private and public sectors a daunting exercise.

## **Southern Africa and the Sectoral Impacts of Climate Change**

In the Southern African Development Community (SADC), where more than 60 per cent of the population live on less than US\$1 a day, three sectors in particular need attention – agriculture, water management and health.

In the agriculture sector farmers need to be encouraged to switch crop varieties by introducing crops that are more suitable to the weather fluctuations and extremes induced by climate change. This not only requires government leadership, but also private-sector buy-in. The private sector is behind the development of improved seeds, which can be achieved only after years of research (intellectual property rights). Government and the development partners can assist farmers by putting resources into seed development. Other measures include shifting from crops to grazing; adopting irrigation technology; and developing and maintaining flood control measures. Administrative aspects include adopting viable land-management and land-husbandry techniques, such as measures to assess and monitor food availability, food accessibility and nutrient access.

One of the main challenges is that financial institutions are often reluctant to extend credit to this sector because of the high risk associated with farming. Adaptation measures, such as flood-control measures, not only affect farmers, but the community at large, and hence require government participation in part or in full to raise the required resources.

In the water management sector, the Southern African region has witnessed an increase in droughts and floods, which disrupt economic and social activity in communities. Resources to finance the construction of water catchment areas are required. In the health sector

insufficient water as a result of drought causes food shortages, which in turn may lead to malnutrition. Floods also bring with them water-related diseases, such as malaria, as well as water-borne diseases, like cholera and dysentery. According to the SADC Secretariat, strategies need to be developed for assessing, monitoring and addressing health-related risks, such as malnutrition from the reduction in crop yields and related diseases, as well as for assessing the effect of health impacts on economic growth. The overall costs to Africa – as measured by GDP – if adaptation measures are not implemented is 1,7 per cent, 3,4 per cent and 10 per cent if temperatures rise by 1 °C, 1,5 °C and 4 °C, respectively, by 2030.<sup>1</sup>

Financial barriers to climate change adaptation come in two principal forms. The first is the inadequate financial resources to support adaptation measures. In developing countries, for example, the tax base to generate financial resources is very thin. The second form relates to the lack of skills or capacity required to access the available resources for the purposes of climate change adaptation. The latter is the most insidious, as it also relates to the inability of governments to realise that adaptation is an important part of a country's development policy.

Although financial resources for adaptation are available mainly from the UN programme on climate change, African countries face both international and domestic challenges in accessing them. In both instances, the common challenge is the lack of depth in understanding climate change issues. Development policy frameworks in SADC (save for South Africa and a few other countries) do not include climate change adaptation as a means of achieving long-term sustainable economic growth. The sections that follow discuss the sources of the available finance and the challenges faced by governments and local communities in accessing and using the funds for adaptation purposes. It concludes by consolidating the financial barriers to adaptation implementation.

## **Welfare and Economic Effects of Climate Change**

To better understand the relevance of adaptation it is important to first present the welfare implications emanating from climate change. Changing weather patterns, drought or too much rain will impact on food security, particularly for the poor. It is expected that Southern Africa's rainfall will decline over the years as droughts and floods increase in frequency.<sup>2</sup> Subsistence farming is the main source of income for the

continent's households. Declining agricultural output threatens food security and undermines the poverty-alleviation measures espoused by the UN Millennium Development Goals (MDGs). It has been noted that higher temperatures result in warmer and more toxic inland water resources, which led the Council for Scientific and Industrial Research to predict that there will be an increase in blue-green algae blooms, which are toxins produced by biological organisms that can affect both the liver and nerve system, and which will poison most water in South Africa if current trends in climate change continue. The situation is aggravated by the fact that higher surface water temperatures, combined with heavily polluted waters, could lead to circumstances ideal for mixed and much more lethal toxic blooms.<sup>3</sup> As for water resources, it is expected that Southern Africa's rainfall will decline over the years as droughts and floods increase in frequency.<sup>4</sup>

For business, declining and erratic water levels due to drastic weather patterns disrupt operations of companies and increase the costs of inputs, thus affecting performance (profits) and employment, which in turn depletes the tax resources available to government. A 2009 study, for example, found that South African Breweries, in its local operation, uses 155 litres of water for every litre of beer produced. This encompasses the entire value chain – from crop cultivation and processing to brewing and distribution. Most of the water (98,3%) is used in the cultivation of crops.<sup>5</sup>

The impact both on households and companies will inevitably affect government's capacity to deliver services as tax revenues decline. In particular, the agriculture sector, which is a major employer in most countries, will be the worst affected by climate change. This will result in a number of social ills. It is important that government shows leadership on the issues of climate change in general, and adaptation implementation in particular, for without clear programmes (i.e. set goals and targets) it is less likely that the private sector will partner with communities and the government in implementing adaptive infrastructure. This will result in disjointed and ineffective measures.

To adapt to the adverse effects of climate change, stakeholders need financial resources. Although the private sector is seen as having the resources to cope with the challenge of adaptation, households and governments are the most vulnerable. Overcoming the barriers, however, may prove a challenge because of the lack of technical expertise needed to tackle the issues. Therefore the question is, how would an adaptation programme be financed? An even more pertinent question is, what are



the financial barriers of adaptation implementation? In this context it is important to understand the multidimensional barriers, and their linkages in the SADC region.

## **Financial Aspects of Climate Change Negotiations: Access, Transparency, Additionality**

Understanding the financial barriers to climate change necessitates an explanation of the concepts of access, transparency and additionality. The first two relate to the governance of the funds made available; additionality addresses the scarcity of funds. This section considers, firstly, how sufficient finance could be delivered to ensure fair and urgent access for developing countries; secondly, it looks at how it could be governed; and, thirdly, it considers options for generating finance for adaptation from new and existing sources.

Oxfam identifies about six categories of funding that serve as a means of channelling climate financing: multilateral development bank (MDB) funds; UN funds; government-promoted funds; public-private investment funds; carbon markets; and unilateral fiscal support.<sup>6</sup> Some of these are discussed below. Although the constituencies served by these funds are concentrated (i.e. mainly government, government-related organisations and NGOs), it may present a challenge to govern these entities under one umbrella, which is an idea that developing countries are canvassing for. Developing countries' discontent arises from the fact that most of the funds are governed through intermediary institutions, such as the World Bank, that design processes of applying for the funds without the inputs of developing countries, which mostly are the ones in need of the resources. This is where country groupings such as SADC are necessary.

The governance issue arises not merely because there are many funds emanating from different sources, but also because existing funding to developing countries is in the form of official development assistance (ODA), which may be reclassified as adaptation finance.<sup>7</sup> This will have implications for SADC member states that have incorporated ODA finance into their national budgets. It is, therefore, important to have one governance structure – if not from the providers of the financial resources, then surely it should come from the SADC arrangement. Unity at SADC level will give the region significant bargaining power.

One of the chief implications is access. According to an Oxfam research report,<sup>8</sup> issues of access mean different things to different stakeholders. For example, to rich countries it is about the available

funds being used for the very purpose for which they were solicited. For poor countries in SADC the issue is about availability of the resources. It is also about developing appropriate documentation for specific projects. One way to improve access is for SADC countries to institutionalise access by developing instruments that facilitate access of Clean Development Mechanism (CDM) project developers. The Economic Community of West African States and the Development Bank of Central African States have set a precedent in this regard. According to Persson et al., access for developing countries to UNFCCC funds must be simplified in accordance with the Copenhagen Agreed Outcome.<sup>9</sup> Among other things, this entails a clear and stable framework on how eligibility and prioritisation based on countries' vulnerability are determined. Other criteria, such as coherence with national development plans, cost-effectiveness and appropriateness, also need to be internally prioritised.

Improving access to adaptation resources includes empowering developing countries to be able to assess the risk posed by climate change and to better cost, prioritise, sequence and integrate robust adaptation strategies into their development plans and budgets in a context of high uncertainty, competing needs and limited financial resources.<sup>10</sup>

The latest proposal by the Commission on Climate Change and Development regarding the financing adaptation projects is that, firstly, donors should honour their commitment of paying 0,7 per cent of gross national income as ODA. Over and above this commitment, donors have been urged by the Commission to commit additional resources to help developing countries cope with climate change adaptation.<sup>11</sup> While the concept of additionality has not clarified where the extra resources will come from, it is important that donor countries develop a mechanism of monitoring and tracking the use of such funds. Additionality and transparency are closely tied. For donors to make available additional funds they should know how those funds are managed.

Although ODA has played an important role in supporting the budgets of developing countries, over-reliance on these funds poses serious risks for adaptation in developing countries. Some countries aim to generate revenue by introducing or increasing travel-related taxes. As articulated by the African Partnership Forum, the benefit of developing an internal revenue-generating process is that it creates autonomy. Although this is a notable innovation, SADC member states are mostly small economies, save for South Africa, whose travel activity is relative-

ly insignificant and will have a limited effect on improving adaptation resources.

To a large extent, SADC member states need to tap into South Africa's resources in terms of human-capital capacity. It is important for South Africa to take the lead in climate change discussions at the regional level. At the same time, the smaller economies in SADC need to positively engage South Africa so as to deal with the issue of the country being perceived as imposing while avoiding being seen as dominating the climate change discussion for self-interest at a regional level.

## Financing Requirements for Climate Adaptation and Sources of Funding

Estimates of the cost of implementing climate change adaptation in developing countries vary considerably. One source places the cost at between \$2,2 and \$4,3 billion a year;<sup>12</sup> the World Bank puts it at between \$4 and \$41 billion a year; the UNDP at \$86 billion by 2015; and the UNFCCC estimate is \$28–67 billion by 2030. Stern<sup>13</sup> notes that compared to the costs of adaptation, climate change mitigation requires 1 per cent of world output (GDP) every year until the year 2030. This is the equivalent of \$619,4 billion a year if we take total world output in 2010. In a study commissioned by the World Bank the costs of adaptation per region were enumerated; the results are presented in Table 7.1.

Changing climatic conditions make it increasingly difficult to extrapolate the costs of adaptation from past practices. The World Bank has estimated the additional costs necessary to protect all new investments (financed by ODA, foreign direct investments [FDI] and domestic funds) in developing countries to be between \$4 billion and \$37 billion.<sup>14</sup>

**Table 7.1 Annual costs of adaptation for all sectors, by region, 2010–2050 (\$ billions at 2005 prices)**

|                                                                               | East Asia and Pacific | Europe and Central Asia | Latin America and Caribbean | East and North Africa | South Asia | Sub-Saharan Africa |
|-------------------------------------------------------------------------------|-----------------------|-------------------------|-----------------------------|-----------------------|------------|--------------------|
| National Centre for Atmospheric Research, wettest scenario                    |                       |                         |                             |                       |            |                    |
| Net sum                                                                       | 2.5                   | 9.3                     | 21.5                        | 3.0                   | 12.6       | 18.1               |
| Commonwealth Scientific and Industrial Research Organisation, driest scenario |                       |                         |                             |                       |            |                    |
| Net sum                                                                       | 19.5                  | 5.2                     | 16.8                        | 2.9                   | 15.5       | 16.9               |

Source World Bank, 2010. *Economics of adaptation to climate change*. Washington, DC: World Bank.

**Table 7.2 SADC states' GDP and government revenues**

| Country                      | GDP<br>(\$ Billion) | GDP per<br>capita<br>(\$, 2009) | Government<br>revenue<br>(\$ Billion) |
|------------------------------|---------------------|---------------------------------|---------------------------------------|
| Angola                       | 85.8                | 1 892                           | 32.9                                  |
| Botswana                     | 12.5                | 5 959                           | 4.2                                   |
| Democratic Republic of Congo | 12.6                | 170                             | 3.9                                   |
| Lesotho                      | 1.8                 | 780                             | 0.9                                   |
| Madagascar                   | 8.3                 | 448                             | 0.9                                   |
| Malawi                       | 5.0                 | 318                             | 1.7                                   |
| Mauritius                    | 9.4                 | 6 729                           | 2.0                                   |
| Mozambique                   | 10.2                | 418                             | 2.9                                   |
| Namibia                      | 11.5                | 4 288                           | 2.9                                   |
| Seychelles                   | 0.9                 | 9 354                           | 0.3                                   |
| South Africa                 | 354.4               | 5 707                           | 94.0                                  |
| Swaziland                    | 3.2                 | 2 668                           | 0.9                                   |
| Tanzania                     | 22.4                | 526                             | 5.7                                   |
| Zambia                       | 15.7                | 985                             | 3.1                                   |
| Zimbabwe                     | 5.6                 | 324                             | 1.9                                   |
| Total                        |                     |                                 | 158.0                                 |

| Developing Countries' Requirements |                           |
|------------------------------------|---------------------------|
| World Bank                         | US\$ 4–41 billion/year    |
| UNDP                               | US\$ 86 billion by 2015   |
| UNFCCC                             | US\$28–67 billion by 2030 |
| Takemoto and Mimura (2009)         | US\$ 2.2–4.3 billion/year |

**Source** IMF, 2011. Available at: <http://www.imf.org/external/data.htm>; World Bank, 2011. Available at: <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,menuPK:476823~pagePK:64165236~piPK:64165141~theSitePK:469372,00.html>; UNDP, 2007. *Wealthier nations should lead emission cuts and provide incentive for developing CEE and CIS countries to go green*. Available at: <http://hdr.undp.org/en/media/PR5-HDR07-ECIS-E-final.doc.pdf>; UNFCCC, 2011. Accessed at: <http://unfccc.int/2860.php>; Takemoto, A. and Mimura, N., 2009. *Effective adaptation policies and measures in developing countries*. Nineteenth Asia-Pacific Seminar on Climate Change. 20–22 July 2010. Kitakyusyu. Available at: [http://www.climateanddevelopment.org/ap-net/docs/19th\\_seminar/4-2\\_TokyoUnv\\_Mr.Takemoto.pdf](http://www.climateanddevelopment.org/ap-net/docs/19th_seminar/4-2_TokyoUnv_Mr.Takemoto.pdf). All websites accessed in March 2011.

The wide range is can be accounted for by climate risk uncertainty on domestic investments. This estimate was calculated by assuming that 20 per cent of ODA-funded projects (\$100 billion/flow per year), 10 per cent of FDI projects (\$160 billion) and between 2 and 10 per cent of domestic investments (\$1 500 billion) are climate-sensitive and that the costs of adaptation range from 5 to 20 per cent of project cost. Given that the total cost of adaptation is much larger, these figures must be used with care and are only useful order-of-magnitude estimates.

Noting that figures vary, there is a global funding shortfall of approximately \$86 billion per year until 2015 between the finance required by developing countries for adaptation and what is available. Of this amount between \$16,9 and \$18,1 billion is required in Sub-Saharan Africa annually.<sup>15</sup> To contextualise the shortfall, Table 7.2 shows that this is more than all the goods and services (GDP) produced by most SADC countries. It is also way above government revenue of most countries in the region. This highlights the depth of financial challenges that SADC member states are facing regarding mobilising funds for climate change adaptation. Voluntary contributions under the UNFCCC that are geared towards helping developing countries are a mere \$300 million, of which only half has been disbursed.<sup>16</sup>

There are approximately 22 climate funds worldwide, but Africa has access only to a few because climate change has not been incorporated into development plans of most African governments. There is also the problem of a lack of human capital to help policy makers understand the importance of the subject. Furthermore, most of the funds are packaged as loans, making it difficult for governments to approach financiers on an issue they themselves do not understand.

The costs posed by the need for Africa to adapt to climate change make it all the more urgent that international assistance for adaptation be given highest priority. There are several funds developed under the UNFCCC to support developing countries, although questions remain concerning their scale, management and access to finance. Other financing options, such as levies on joint implementation projects, should also be considered. Finally, international private financing, either separately or through FDI projects, to meet host countries' regulatory requirements can play a significant role while through public-private partnership, ODA can be used to promote the development of climate-related insurance.

There are a number of sources of financing for climate change adaptation. These include:

- multilateral funding (grant, loan and concessional),
- national or domestic investment,
- bilateral investment and donor funding,
- insurance and other risk-management instruments,
- private-sector instruments and
- market-based instruments (e.g. carbon finance).

## Sources of finance

The 2007 Bali Action Plan laid out a road map for internationally acceptable strategies for dealing with climate change. It came up with new financing measures that had to be adopted in order to tackle the issues of adaptation and mitigation. Under this plan, emphasis was placed on:

- innovative means of funding,
- public-private sector funding and investment and
- facilitation of carbon-friendly investment.<sup>17</sup>

The main challenge regarding finance relates to the involvement of the private sector. Companies are known for managing firm-specific risks and are, therefore, expected to approach the risks posed by adverse climate changes no differently. It may well seem that most of the revenue for risk mitigation will have to come from the UN agencies, multilateral organisations and public-private sector partnerships.

### ***Bilateral initiatives for financing climate change adaptation***

There are a number of other bilateral initiatives aimed at providing resources for developing countries. Most of these are in the form of loans. Few are direct grants. The initiatives include:

- Cool Earth Partnership (Japan). This \$10 billion facility, set up by the Japanese government, provides grants and loans for adaptation and mitigation projects and is available until 2012. It has up to \$2 billion for improving access to clean energy, and \$8 billion in preferential interest rate loans for mitigation projects.
- Climate and Forest Initiative (Norway) – a \$2,2 billion Norwegian government fund, available until 2012, which provides grants for mitigation projects. It has pledged \$102 million to the Amazon Fund, an NGO that will use the money to help conserve the rain-forests of the Amazon River Basin.

- International Window of the Environmental Transformation Fund (United Kingdom) – money from this fund, established by the UK government, is available until 2010. It hopes to allocate most of the \$1,18 billion available via the World Bank Climate Investment Fund, set up in 2008 to help developing countries implement mitigation and adaptation projects; Amazon Fund (Brazil) – so far, only Norway has pledged \$102 million to this fund, which is supposed to have about \$1 billion. Donations will be administered by the National Development Bank of Brazil.
- International Climate initiative (Germany) – this \$764 million fund, established by the German government, hopes to raise 10 per cent of its allowances from the Emission Trading Scheme of the European Union, under which energy-intensive companies can buy and sell permits allowing them to emit carbon dioxide.
- The International Forest Carbon Initiative (Australia) – this fund, set up by the Australian government, hopes to provide grants from its pool of \$129 million for mitigation projects until 2011.
- UN Development Programme – Spain Millennium Development Goal Achievement Fund, Environment and Climate Change thematic window – this \$90 million initiative will provide grants for mitigation and adaptation projects until 2010; Global Climate Change Alliance – this \$76 million fund created by the European Commission provides grants to the most vulnerable countries, such as small islands, for adaptation and mitigation projects.<sup>18</sup>

## United Nations Framework Convention on Climate Change

As part of the agreement among parties to reduce global warming, countries that are members of the UNFCCC have also developed instruments of funding climate change adaptation and mitigation. Funding agencies under the UNFCCC umbrella were also created. The UNFCCC falls under the category of a multilateral finance provider. Central to SADC member states are the funding instruments discussed in the following sections.

### *Adaptation fund*

The Adaptation Fund was established by the Parties to the Kyoto Protocol of the Framework UNFCCC to finance concrete adaptation projects and programmes in developing countries that are Parties to the Kyoto Protocol. The fund is financed with 2 per cent of the Certified

Emission Reductions issued for projects of the CDM and other sources of funding. Funds are provided in the form of loans to developing countries.

### ***Special climate change fund***

The Special Climate Change Fund was established under the UNFCCC in 2001 to finance projects relating to adaptation; technology transfer and capacity building; energy, transport, industry, agriculture, forestry and waste management; and economic diversification. This fund should complement other funding mechanisms for the implementation of the UNFCCC.

### ***Least developed countries' fund***

The Least Developed Countries Fund (LDCF) is managed by the Global Environment Facility (GEF) and aims to address the special needs of the least developed countries (LDCs), which are especially vulnerable to the adverse impacts of climate change. By October 2010, total deposits amounted to \$169 million. The main contributors to this fund are Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the UK and the US. Of the total, \$141 million has been disbursed, of which \$95 million went to low-income<sup>19</sup> countries while low-middle-income countries received \$46 million. All countries in SADC have had at least \$420 000 approved by the GEF for them to do a scoping exercise on climate change adaptation and mitigation.<sup>20</sup>

The LDCF supports two types of activities. The first is the preparation phase, which provides a process for LDCs to identify priority activities that respond to their urgent and immediate needs to adapt to climate change. The second phase is the implementation of activities, which includes the design, development and implementation of projects on the ground. Throughout the implementation phase projects are monitored to measure progress, and at project completion, a terminal evaluation is required to assess the effectiveness of the adaptation measures implemented. For a country to be eligible to support from the LDCF they are measured on the following criteria:

- Country ownership
- Programme and policy conformity
- Financing



- Institutional coordination and support
- Monitoring and evaluation<sup>21</sup>

## Government funding

The responsibility of ensuring the implementation of climate change adaptation rests mainly with the government (national or local). This means government has to mobilise resources, both human and financial, and all stakeholders, which include the community where the project will be implemented. This responsibility implies that government has to mobilise resources not only from cooperating partners, but also its own resources by allocating a share of its constrained national budget to build the necessary infrastructure and logistics to implement climate adaptation programmes and activities. Governments have resorted to the introduction of a carbon tax and other levies, which vary from country to country, as a direct way of obtaining some of the required resources. South Africa, for instance, introduced a carbon tax on the purchase of new passenger vehicles, which is based on their certified CO<sub>2</sub> emissions at the cost of R75 per g/km for each g/km above 120 g/km. The objective of the emissions tax is to encourage South Africans to move towards more energy-efficient and environmentally-friendly vehicles. Other countries have introduced carbon tax as a fuel levy. Government can also raise adaptation finance by introducing levies such as the electricity levy in South Africa. As discussed above, these resources often fall short of the resource requirement because powerful lobby groups argue that such a tax increases the cost of living for the ordinary consumer.

## Capital markets

Capital markets present another channel for raising resources for adaptation.

### *Bonds*

In 2008 the World Bank and the Swedish Bank SEB entered into a partnership and issued 'green bonds'. According to the Stockholm Environment Institute, the SEB introduced the product upon demand from Scandinavian investors, mainly pension funds and insurance companies, who wanted a product that could help them channel large sums of investment earmarked specifically for climate change measures. By November 2009, two green bond issues had raised to the value of

approximately \$665 million from both public and private investors. Of this amount, 20 per cent is set aside specifically for adaptation projects, which the World Bank will provide as loans for:

- flood protection (including reforestation and watershed management),
- food security and stress-resilient crops and
- sustainable forest management and 'avoided deforestation'.

The African Development Bank<sup>22</sup> followed suit by issuing Clean Energy bonds in May 2010. The bond issue, due in November 2013, with one denominated in New Zealand dollars and the other in Australian dollars, was targeted at Japanese retail investors. The issue followed the successful first Clean Energy bond issued in March 2010 for an amount of NZD109 million. Mizuho International plc is acting as sole lead manager for the two bond issues. The money is then disbursed to adaptation/mitigation projects. Unless these bonds come with a reasonable return on investment, they are not attractive for the private sector. Furthermore, the local communities, who are the most affected, have no recourse to these resources.

More importantly, in most SADC countries stock or bond markets only exist by name. There is very little trading, as the private sector is very small and most of the companies tend to be a subsidiary of a parent company in a bigger economy (e.g. South Africa). Raising capital for the subsidiary is a relatively easy task, as they approach the parent company. There is also the challenge of the stock exchanges being illiquid.<sup>23</sup>

### ***Equity finance***

While this is one of the best methods of financing investment projects, the challenge is that it has to be accompanied by some fixed asset components and generate financial returns and activities, such as flood-prevention infrastructure, health programmes and national disaster planning. Although these projects are necessary, they do not attract equity investors, since they are not backed by fixed assets. In addition, the benefits of the project financed by equity finance accrue to the community at large and cannot be captured within the project itself.

### ***Debt finance***

Debt finance can be a means of financing as long as it can be proven that the means to repay the debt exists. In the public-sector context borrowing can be made against future tax revenue. However, most countries' tax

resources are inadequate, and this is an additional financial burden which countries can ill afford because they already suffer from debt overload.<sup>24</sup>

## Multilateral banks

### *The African Development Bank*

Although Africa as a whole contributes less than 4 per cent of global greenhouse gases, it is the continent's vulnerability to climate change that makes the issue a priority. Africa's climate change challenges are unique in that while there is a high level of vulnerability, emission patterns related to agriculture and land use are the more serious ones and are never factored into the design of global adaptation and mitigation frameworks. Hence the importance of coming up with continent-specific programmes and funding that would for instance lead to increased production and minimal land use, which are cardinal as adaptation and mitigation measures for Southern Africa.

According to the African Development Bank (AfDB), by 2015, Africa will need between \$22 billion and \$31 billion a year to finance adaptation projects and put the continent on a low-carbon growth pathway. By 2025 that estimated amount is expected to grow to between \$52 billion and \$68 billion a year. In addition to that, climate-proofing will add 40 per cent to the cost of meeting the MDGs. This will require international financial assistance estimated at \$100 billion a year.

In recognition of the high vulnerability of communities in Africa, the AfDB is involved in providing support to African countries. The AfDB has partnered with other institutions to provide financial support for projects aimed at both adaptation and mitigation. The bank has developed two funds to support countries on climate change adaptation and mitigation, namely; the *Climate for Development in Africa Fund (ClimDev-Africa)* and the *Green Fund*.

The ClimDev-Africa was created by a conglomerate of institutions – the AfDB, the African Union Commission and the United Nations Economic Commission for Africa (UNECA). Based at UNECA in Addis Ababa, ClimDev-Africa was formed because of the inability of government institutions, development practitioners and service providers to effectively manage climate risks and to link climate change concerns to development imperatives because of the lack of appropriate climate information and services. The fund's target sectors are those that are climate-sensitive, such as agriculture and food security, water resources, energy and health. It will also assist in sound policy making based

on information and analyses on policy options, including acquisition of capacity by African governments to use the information to design effective and robust policies.

Among other things, the Green Fund is designed to receive and manage resources allocated to Africa from all sources, including the fast-track financing and long-term pledges made under the Copenhagen Accord to finance projects and programmes that contribute to climate resilience and low-carbon development in Africa. It also aims to balance the allocation of resources between adaptation and mitigation, as opposed to the latter getting a disproportionate share. Globally, according to data released in December 2010 by the UNFCCC, climate change mitigation projects have received the biggest share in all categories of funds in the UN.<sup>25</sup> In SADC the release indicates that eight mitigation projects have received financing compared to five adaptation projects.

### **World Bank**

The World Bank has a number of finance mechanisms for climate change purposes: adaptation and mitigation. The main financing mode is the World Bank Climate Investment Funds which have three components: the Climate Investment Fund (CIF), the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF). These were introduced in 2008. Collectively, the eight members of the most developed economies in the world have made pledges of approximately \$5,7 billion, as follows: the US (\$2 billion); Japan (\$1,2 billion); the UK (approx. \$1,1 billion); Germany (approx. \$710 million); and France (approx. \$260 million). The other pledges are in the order of \$100 million or less.

The CTF is a climate fund mainly aimed at mitigation measures, whereas the SCF will help more vulnerable countries develop climate-resilient economies and take actions to prevent deforestation. Under the CIF programme, Bangladesh, Bolivia, Cambodia, Mozambique, Nepal, Niger, Tajikistan and Zambia have benefited in the Pilot Program for Climate Resilience, which provided about \$500 million for scaled-up action and transformational change in integrating climate resilience into national planning.

While these funds give the CIF a real possibility to become the most important international financier to combat climate change, they operate on loans as opposed to a grants basis, and their effectiveness in providing finance for mitigation and adaptation is doubtful, given the limited capacity of developing countries to access funds on this basis.

**Table 7.3 Institutions offering climate change finance**

| Institution                                                        | Facility/area of focus                      |                                   |                                                |                                    |                                      |                              |
|--------------------------------------------------------------------|---------------------------------------------|-----------------------------------|------------------------------------------------|------------------------------------|--------------------------------------|------------------------------|
|                                                                    | ADB and Climate Change Mitigation           | ADB and Climate Change Adaptation | Clean Energy Financing Partnership Facility    | Small Grants to Promote Adaptation | Water Financing Partnership Facility | Poverty and Environment Fund |
| Asian Development Bank (ADB)                                       |                                             |                                   |                                                |                                    |                                      |                              |
| Caribbean Development Bank                                         | Disaster risk management and climate change |                                   |                                                |                                    |                                      |                              |
| European Investment Bank                                           | Climate change initiatives                  |                                   |                                                |                                    |                                      |                              |
| International Bank for Reconstruction and Development (World Bank) | Climate Investment Funds                    | Programmes and partnerships       | Vulnerability and adaptation to climate change | Mitigation                         |                                      |                              |
| International Finance Corporation                                  | Cleaner technologies                        | Sustainable energy and water      | Carbon finance                                 |                                    |                                      |                              |

Source Asian Development Bank, 2011. Available at: [www.adb.org/climate-change](http://www.adb.org/climate-change); Caribbean Development Bank, 2011. Available at: [www.iadb.org/en/topics/climate-change/climate-change,1448.html](http://www.iadb.org/en/topics/climate-change/climate-change,1448.html); European Investment Bank, 2011. Available at: [www.eib.org/projects/topics/environment/climate-action/index.htm](http://www.eib.org/projects/topics/environment/climate-action/index.htm); International Bank for Reconstruction and Development (World Bank), 2011. Available at <http://www.worldbank.org/>; International Finance Corporation, <http://www.ifc.org>. All sources were accessed in March 2011.

### ***Global Environment Facility***

Established in 1991 to assist in the protection of the global environment and to promote environmentally sustainable development, the GEF provides new and additional grants and concessional funding to cover the costs associated with transforming a project with national benefits into one with global environmental benefits. Three institutions were involved in setting up the GEF: the UNDP, the UNEP and the World Bank.

### **Private sector**

Regarding private-sector financing of climate change adaptation, the OECD adopted in the 1970s the polluter pays principle (PPP). Financing climate change, however, is more complex than suggested under the climate change policy of the OECD countries. The PPP approach is linear and simply assumes that the polluter bears the costs of environmental degradation. However, in a world where developing countries, particularly those in Africa, are the least polluters and yet the most affected by adverse climate change, the PPP approach would thus not be adequate for developing countries, which have a relatively small private sector engaged in productive (polluting) activities. Consequently, financing adaptive measures would need to be supplemented by other resources.

## **Conclusion and Policy Considerations**

At a regional level, SADC's policy on climate change has incorporated the key elements of poverty, food security and sustainable development. These are included in national policies and strategic frameworks, with most countries having only adopted multilateral positions. In most countries in SADC climate change has not been effectively mainstreamed into government policy. According to the SADC secretariat, member states have adopted international initiatives relevant to climate change, such as the UNFCCC, the Montreal Protocol, the Kyoto Protocol, the UN Convention on Biodiversity, and the UN Convention to Combat Desertification. However, these initiatives are yet to be effectively and efficiently operationalised. Financial barriers to adaptation implementation in SADC can therefore be summarised as follows:

- Müller highlights that the main criticism of 'conventional' funding through bilateral, multilateral, ODA and development partners is the fact that the developed countries decide what happens

with the money provided for climate change initiatives, although it is the developing countries that experience the most damage caused by the highest-polluting countries, mainly developed countries.<sup>26</sup> Many financing initiatives fall short in supporting developing countries to effectively participate in climate adaptation. Consequently, for developing countries a number of barriers to financing climate change adaptation still remain, as discussed below.

- By providing loans, as opposed to grants, to finance initiatives for developing countries to implement programmes and activities to address past and expected future pollution, developed countries increase the debt burden on those countries. These initiatives are, therefore, not attractive for developing countries, which already face debt overhang. The effectiveness of these mechanisms is doubtful.
- The finance initiatives generally limit the ability of communities to implement adaptation measures. The capacity for communities to adapt is influenced by a society's productive base, including natural and artificial capital assets, social networks and entitlements, human capital, institutions, logistics, governance, national income, health and technology.
- The carbon market has not brought the required resources to Africa, whereas several hundred projects in Mexico, Brazil, India and China are financed under the Clean CDM.<sup>27</sup> There is only a handful of CDM projects in South Africa, and very few others in the rest of the continent.<sup>28</sup> One reason why Africa is not benefiting from the CDM is because emissions from agriculture and other land-use practices are not included in it, although these are important parts of the African economy. Be that as it may, the main reason is that many SADC member states do not have the internal capacity to deal with climate change issues. In fact, SADC countries are under-capacitated across government departments mainly because of skilled labour emigrating to countries that offer better opportunities than their home country.
- The implementation of adaptation measures under the UNFCCC poses two major barriers to the international funding of such measures. First, in line with Article 3.3 of the UNFCCC, the GEF Operational Strategy prescribes that activities need to have global benefits in order to be eligible for funding. Mitigation activities, aimed at reducing atmospheric greenhouse gas concentrations,

have global benefits. For many of the adaptation activities, it is difficult to imagine how universal benefits can be produced. Second, the GEF would not cover the full costs of adaptation (however defined). The GEF assumes that some development and upgrading of systems will take place irrespective of climate change.

- In addition to the barriers to adaptation funding raised by the GEF Operational Strategy, there is the issue that adaptation is not considered a development objective. This challenge is mainly the result of lack of technical capacity in SADC. The result is that countries tend to go along with what has been agreed at international forums. Consequently, it has a low priority for FDI. As opposed to the implementation of mitigation technologies which can contribute to the development of a country's energy-consuming sectors, adaptation is primarily aimed at preventing or reducing damage to these and other sectors. Moreover, since adaptation often addresses site-specific issues it will have to be designed and implemented with local considerations in mind. This often hampers the effective transfer of successful adaptation options, thus making adaptation less attractive from a commercial investment perspective.
- Most SADC economies are too small to develop capital markets, much less products that are aimed at climate change adaptation. Many SADC stock markets are illiquid so that even if climate change products were introduced there would be too few subscribers.

To improve access to financing the following measures should be considered:

- Rationalising the ever growing number of funds, including eliminating duplications and harmonising the governance of these funds in order, among other things, to reduce conditionalities to disbursement of the funds.
- Streamlining bureaucratic procedures.
- Reducing transaction costs.
- Considering equity as a factor in the allocation of funds based on need, including the use of vulnerability criteria when deciding on resource allocation.
- Developing effective systems to ensure transparency and accountability in the use of funds mobilised for climate change.



- Probably the most important measure for funding, however, is that it should be new and additional to existing development funds and reliable in the long-term.

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# 8

## Financial barriers to adaptation implementation

### A South African case study on financing water adaptation

*Michelle Pressend*

#### Introduction

Adaptation is regarded as one of the most pressing issues in assisting vulnerable countries to cope with the accumulated emissions released into the atmosphere, resulting in climate change. According to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, adaptation is 'designed to assist countries in adapting to the adverse effects of climate change. It facilitates the development and deployment of techniques that can help increase resilience to the impacts of climate change'.<sup>1</sup>

Funding for adaptation is meant to be largely directed at poor and underdeveloped countries, as these are least responsible for climate change, but have to cope with its adverse effects. Three funds have been created under the UNFCCC and the Kyoto Protocol to fund adaptation projects: the Least Developed Countries Fund, the Special Climate Change Fund and the Adaptation Fund. An umbrella fund, called the Green Climate Fund, is in the process of formation and was approved in Cancún.<sup>2</sup> Availability and transfer of funds from developed to developing countries is a huge point of contention. How much is needed, how much has been made available so far, the governance of these funds and procedures and conditions for accessing these funds are at the centre of debates in the climate negotiations.

The South African government in its National Climate Change Response Green Paper 2010 has prioritised water, along with agriculture

and health as the key adaptation sectors in the short to medium term.<sup>3</sup> Focusing on water adaptation, this chapter argues that current and proposed actions to adaptation in South Africa are mostly limited technical solutions or ‘fixes’. The UNFCCC’s database on adaptation planning and practice in South Africa shows seven projects on water resources. Out of the seven projects, the Integrated Water Supply and Infrastructure Management Programme for the Western Cape, covers a range of actions, with its main approach being to use less water. The rest of the projects are mostly focused on strategies and approaches, or are technical in nature.<sup>4</sup> Essentially, these solutions deal with the symptoms instead of addressing the root causes and reducing South Africa’s socio-economic and environmental inequalities.

Madzwamuse emphasises that South Africa’s approach to its vulnerability assessment centres on the technical dimensions and that ‘social vulnerability is neglected, particularly the question of poverty and social vulnerability’.<sup>5</sup> Consequently, some of these technical and project approaches may lead to ‘maladaptation’, meaning that vulnerability may be increased among the poor and marginalised. Therefore, those struggling to maintain their livelihoods and people living on society’s margins as a consequence of neo-liberal economic policies, such as privatisation, deregulation and trade liberalisation, are likely to become worse off. Climate change will magnify food insecurity, scarcity of water resources and precarious livelihoods, which could lead to increased conflict and destabilisation. Therefore, how adaptation is defined may determine the response to and therefore, the costs of adaptation.

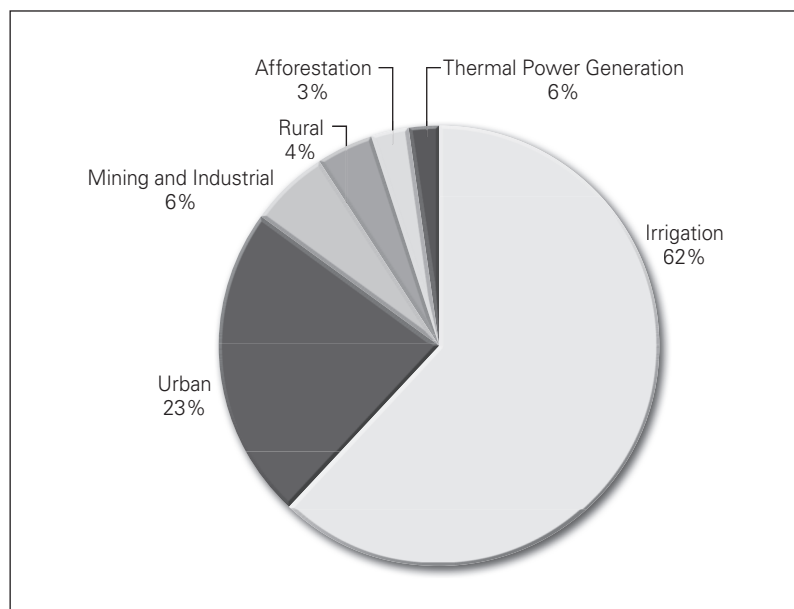
In this context, this chapter raises concerns about adaptation measures posed by the South African government and explores the financial barriers that limit solutions to reduce social inequalities and preserve environmental integrity in the water sector and in the adaptation process in general. Moreover, the analysis highlights that developed countries are not living up to their financial obligations or assuming responsibility for their contribution to climate change, and that the South African government, like most other countries in the region, has not prioritised a holistic approach to adaptation that will lead to improving the well-being of people and the environment. In conclusion, the chapter proposes some ideas and policy considerations on how to address these barriers to adaptation in the water sector in South Africa in terms of a broader framing of adaptation, to address some of the systemic challenges of unsustainable consumption and production patterns, and support ‘sustainable adaptation’<sup>6</sup> to climate change.

## Water Adaptation Weaknesses in South Africa

In South Africa, the economic distribution of water indicates that irrigation is the highest water user followed by increasing water demand in urban centres, which are growing rapidly, adding stress to the water-supply systems (see Figure 8.1).

Regarding the socio-economic circumstances of water in South Africa's second communication to the UNFCCC, the report points out that 'the state has increased access to basic water services by 9 million people since 1994, but this has been concentrated in the urban areas'.<sup>7</sup> The report further reveals that in 2006, 3,3 million people still lacked access to adequate, clean water supplies, and another 15,3 million were without access to sanitation services. The Free Basic Water Policy of 2001 makes provision for the first six kilolitres of water free to all households, as part of the government's strategy to alleviate poverty and improve public health. However, the report acknowledges that this is widely seen as insufficient to meet basic needs. Furthermore, the report warns that predictions indicate that water resources will be fully depleted in the

**Figure 8.1 Economic distribution of water in South Africa**



**Source** Department of Environmental Affairs, 2010. South Africa's second communication to the UNFCCC. Available at: [www.environment.gov.za](http://www.environment.gov.za) [Accessed 24 March 2011]

next 20 years. It stresses that ‘unless alternative water capturing methods are used and consumption patterns are changed, necessary changes will be forced on the country, and the poor and marginalized are likely to be hardest hit’.<sup>8</sup>

The National Climate Change Response Green Paper raises alarm bells and underscores South Africa as a water-scarce country that will exceed the limit of its economically usable land-based sources by 2050 if it pursues current growth trends and water-use behaviour. In addition, the Green Paper stresses that ‘[t]he adverse impacts of climate change as a consequence of changes in rainfall patterns will worsen the problem of systemic water shortages and increase the limits of water resources’.<sup>9</sup>

The Green Paper highlights three challenges of water from the likely impacts of climate change:

- Increased variability in storm flows and dry spells.
- Increased costs as the costs of providing water will rise.
- Rising temperatures – the average rise in temperature as a result of climate change will lead to erratic weather and higher temperatures will increase precipitation and reduce run-off to reach rivers and dams.

The actions on the impacts of water posed by the Green Paper involve maintaining and developing good water-management systems, effective and accountable catchment-management agencies and investing in monitoring capabilities. Other actions include the implementation of cost-reflective water and water-use pricing, including effluent charges, optimising the use of water recycling, increasing investments in waste-water treatment capacity, developing and implementing household rainwater harvesting and implementing integrated water-resource management.

Although these actions are littered with tools, models and strategies to assess the impact of climate change, they fall short of either taking a more holistic approach or addressing the socio-economic challenges facing South Africa. Most of the reports and policy papers on climate change delve into detail on the impacts of the climate change problem. However, the actions do not seem to match the magnitude of the consequences, nor is the nature of water policy assessed.

Firstly, the actions do not consider that climate change is not only a consequence of global and regional processes affecting the supply, quality and distribution of water, but that water resources are also affected by changing policies and management practices as a result of economic

globalisation.<sup>10</sup> Under globalisation, water is increasingly viewed as an economic resource managed through marketisation and privatisation, the development of water-pricing policies and managed by private companies or public-private partnerships. The South African government has adopted cost-reflective pricing and cost-recovery policies, which not only have impacts on how water is managed and distributed but also a huge impact on water access and affordability for the poor.<sup>11</sup> The privatisation of water services through public-private partnerships, full cost recovery, the user-pays principle, the introduction of prepayment water meters, among other developments, have resulted in large increases of cost water and sanitation, particularly for the poor in South Africa. Policies promoting the privatisation of water resources and services are a major financial barrier to adaptation of water resources because the commodification of the natural resource for profit will not only increase competition over water resources, but also direct funding to where the most profit can be generated.

Water scarcity as a consequence of globalisation has not been considered in response to the wide array of shocks and stresses perpetuated by climate change. Responses to climate change are often only limited to institutional, technical and infrastructural challenges, and critical aspects such as the impact and contribution of water privatisation and cost-recovery programmes have not been taken into account. The linkages and/or synergies between climate change and the commodification of water are often ignored, obscuring the implications of water scarcity for human security.<sup>12</sup> Discussions on climate change impacts and responses are often delinked from processes of privatisation and the development of large-scale water infrastructure and transfers.

Secondly, the proposed actions seem to ignore the inequalities in global and local wealth, which are reflected directly in water use. This is particularly evident in the South African Development Community (SADC) where water-poor South Africa uses the largest percentage of the region's harnessed waters. Financial resources to fund water infrastructure are often allocated to areas of development, thereby prioritising economic growth rather than meeting people's social needs. This is evident in the Lesotho Highlands Water Project from which South Africa harnesses water while the majority of Lesotho's poor do not access the benefits.<sup>13</sup> Therefore the uneven balance of power in the region is reflected in water use and distribution. For example, the Limpopo River basin, shared by South Africa, Botswana, Mozambique and Zimbabwe, is a significant resource and arguably used inequitably.

This has implications for food security, environmental stability and neighbouring country development throughout the river basin.<sup>14</sup> Food security is a constant problem; around 1 million people in the basin rely on food aid. South Africa is a heavy user and contributes significantly to diminishing this resource and to environmental degradation in the basin.<sup>15</sup> The problem is likely to be exacerbated by planned coal mining in the Waterberg in South Africa, which will increase South African abstraction and potentially increase environmental degradation.

Thirdly, the actions lack an integrated approach in the different sectors. If industrial agriculture is the biggest user of water through irrigation, then actions need to involve shifting the model of agriculture away from large-scale, chemical, capital-intensive mono-cropping agriculture that relies heavily on fossil fuels in production and guzzles huge quantities of water. However, this does not seem to be on the cards for adaptive actions. Instead, technical solutions proffered are more efficient irrigation systems and the development of drought-resistant seeds.

The nature of industrial agriculture is in itself a significant contributing factor to climate change and as such, poses a barrier to financing water adaptation, as funds may be inappropriately targeted to further developing large-scale capital-intensive agriculture, drawing resources away from agro-ecological production. The 2007 IPCC report (Working Group III) points out that nitrogen fertilisers account for the 38 per cent of emissions from agriculture; this is because chemically fertilised soil releases high levels of nitrous oxide. Industrial agriculture has also contributed to the water crisis through intensive water use and pollution. In addition, monoculture is less resilient to changes in weather patterns, as the loss of dead and living biomass in the soil can result in run-off during extreme rains, contributing to flooding. Intensively farmed soils lose 20 to 80 per cent of their carbon, thereby degrading soil quality and stability, and creating situations vulnerable to climate change.<sup>16</sup> These facts indicate that even without climate change current monoculture industrial agriculture places a huge strain on water resources.

It is clear that agriculture needs to be rethought. It calls for a shift towards agro-ecological-based, smaller-scale units that are not reliant on fossil fuel inputs and large-scale irrigation systems. This necessitates policies that ensure greater land redistribution and that break down agricultural production and spread it more widely, including increased food production in the cities where half the population lives. These are but a few issues that indicate that the proposed water adaptation responses do not take into account the broader consequences of current



water availability and economic growth aspirations. Therefore, it is possible that current adaptation programmes will not improve the socio-economic conditions and livelihoods of the poor, or change the unsustainable consumption and production systems of the wealthy. Indeed, responses are centred on technical improvements, which could lead to greater vulnerability for those they are intended to assist.

The weaknesses in current water adaptation actions and projects having been discussed, the following section elaborates on the financial barriers to adaptation. These include policy and regulatory barriers, the legal basis of defining adaptation under the Convention and accessing finance.

## **Financial Barriers to Adaptation in South Africa's Water Sector**

### **Policy and Regulatory Barriers**

#### ***Marketisation and Privatisation of Public Goods and Services***

Cost-recovery policies adopted by South Africa post-1994 have meant that areas such as water, electricity and other social sectors, which were once the exclusive terrain of the public sector, are now 'corporatised' and operate on the basis of making a profit. Before the establishment of the Water Services Act (No. 108 of 1997), water boards provided the bulk of water to municipalities. These boards were established on the understanding that the rate of water was not to yield any profit, but calculated to cover water costs only.<sup>17</sup> The commodification of water contrasts sharply with the notion of water as a human right, which was recognised in a range of international treaties and declarations. At the 65th UN General Assembly on 28 July 2010, countries voted unanimously, declaring the human right to 'safe and clean drinking water and sanitation'.

The marketisation and privatisation of water means that water is no longer supplied as a free or nominally priced public good, but instead follows the rules of the market. These types of policies affect millions of people's access to water, as they cannot afford to pay market-related prices. And in many cases, the poor pay significantly more for water than higher-income users who are connected to municipal supplies.<sup>18</sup>

In terms of climate change, when water supply decreases, as during years of drought, water prices can potentially increase to ensure full recovery cost for infrastructure and service delivery. To be sustainable,

a corporatised water service provider must maintain a surplus, even if it means restricting or cutting services, to guarantee payment from households.<sup>19</sup> The effects of increasing marketisation can be particularly detrimental to poor people who are unable to afford water services and, in desperation, may turn to the use of distant and/or polluted water sources.

Cost-recovery policies not only affect water access and affordability for the poor, but may also hinder municipalities' need to introduce 'rising block' tariffs so that high-end users of water can pay more. Putting in place demand-side management measures to improve water use efficiency is necessary. Berkowitz points out that tariffs have three purposes:

- Financial sustainability through cross-subsidisation.
- Equitable access through rising block tariffs.
- Environmental sustainability through demand management.

Berkowitz suggests that '[a] best case scenario for a tariff is one that increases demand management and also increases revenue – i.e. rich users will use less, pay more and municipalities will save money and water'.<sup>20</sup>

Municipalities may, however, be averse to implementing rising tariffs because they receive revenues from water 'users', so if they limit the amount of water they may lose revenue. Concerns and barriers for more efficient use of water is that current tariffs do not reflect the scarcity of the resource and municipalities seem hamstrung when it comes to implementing rising block tariffs because they also need to maintain their revenue inflow. This situation illustrates that South Africa's water policy may indeed be a barrier to obtain the finances needed to encourage more efficient use among the big water users and provide greater public access because under the market rules, water management and adaptation programmes need to be 'bankable'.

### ***Limited approach to adaptation: Focus on impact rather than reducing vulnerability***

Looking at South Africa's current water adaptation projects, most seem to be based on strategies and address technical aspects. A weakness in these approaches, as pointed out by Tanuro, is that the technical aspects which are the current focus of adaptation, 'are insufficient to suppress poverty and drastically reduce social inequalities'.<sup>21</sup>

Therefore, the approach to adaptation and the current basis of funding may too be a barrier. Eriksen and Brown underscore that there is no certainty that current climate change responses are sustainable, either socially or environmentally, or that they are likely to contribute to human well-being and poverty alleviation. Eriksen and Brown highlight that adaptation policies and interventions that focus on reducing climate change impacts, such as predicted changes in precipitation or hydrological regimes, while providing some benefits, may even adversely affect vulnerable groups and create social inequity, as well as unintentionally undermining environmental integrity. Therefore, to avoid adaptation funding going into efforts that exacerbate vulnerability and contribute to rising emissions, adaptation needs to be facilitated within a sustainable development framework that leads to fundamental societal transformations, reduces vulnerabilities and aims towards greater social justice and equity.<sup>22</sup>

### Legal basis of adaptation under the Convention

In the current climate change discourse, financing adaptation appears to be the domain of developing countries and/or least developed countries. Mitigation, on the other hand, appears to be the prerogative of developed countries and/or high-emitting countries, such as South Africa. Adaptation is prioritised in poor underdeveloped countries because they have contributed the least to climate change and are most vulnerable to the *impacts* of climate change and therefore need resources – be it financial, human and technical – to cope with and adapt to the severe impacts. These measures often include farmers changing their planting seasons, local authorities building infrastructure to ensure resilience against floods, increasing the use of irrigation, tree breeding, effective catchment management and improving disaster management, among others. Current adaptation projects in agriculture, for example, involve crop rotation and the development of drought-resistant seeds.

The legal definition of adaptation may also prove to be a barrier to financing adaptation that will reduce vulnerability. Roberts et al. stress that overall in the Convention and Protocol, the text on adaptation focuses on planning rather than action. They argue that compared to mitigation, the legal text on adaptation is very weak. This could explain the nature of the projects that are mostly technical and/or based on developing strategies. In addition, they point out that although developing countries were able to achieve some gains in finance governance, such as

the Board of the Adaptation Fund consisting of mostly developing countries (in fact the South African government is represented on the board), it has provided few concrete measures that lead to funding and actions.<sup>23</sup>

According to the Adaptation Fund, 'A concrete adaptation project is defined as a set of activities aimed at addressing the adverse impacts of and risks posed by climate change' and 'an adaptation programme is a process, a plan or an approach for addressing climate change impacts which are broader than the scope of an individual project'.<sup>24</sup> It is questionable whether the Adaptation Fund would support requests for change in production systems in agriculture, moving away from large-scale industrial agriculture or human settlement development, and build decent, sustainable housing for those living in informal settlements in floodline areas.

If the legal framework limits the scope of adaptation programmes to focus on impacts rather than funding programmes to achieve sustainable outcomes to address underlying causes of vulnerability and poverty, then developing countries need to advocate broadening the scope of adaptation.

## **Access to finance**

Having pointed out the challenges in policies and approaches to adaptation that may constrain funding, even if countries put forward eligible projects or programmes to adapt to climate change, a major finance barrier is access to international funds. Firstly, international funds available are very limited and, secondly, programmes often have to subscribe to the interests of donors.

### ***Limited international funds***

Three funds have been created under the UNFCCC and Kyoto Protocol: the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF) and the Adaptation Fund (AF). An umbrella fund, called the Green Climate Fund was approved in Cancún and is in its formative stage. The north-south divide is in evidence in the governance of these funds. The north would like to see the funds managed under the World Bank, the South under the UNFCCC. Developing countries are pushing for the Conference of the Parties to oversee the funds, whereas developed countries prefer the Global Environment Facility (GEF).<sup>25</sup>

International funds have been extremely limited when it comes to adaptation. Concerns from many least developed countries (LDCs)

are about the bureaucratic procedures to access these funds. The Copenhagen Accord committed developed countries to provide \$30 billion in fast-start financing from 2010 to 2012 (divided equally between adaptation and mitigation) and set a goal to mobilise US\$100 billion by 2020. However, past performance on climate financing shows large gaps among resources pledged, deposited and disbursed.<sup>26</sup> Currently, the Adaptation Fund has funded 10 country projects, most of which are water-related, and most projects were only approved in 2010 and 2011.<sup>27</sup> The delays in funding, given that the Adaptation Fund was established under the Kyoto Protocol in 1997, is cause for concern.

Developing countries, especially LDCs, have complained that accessing resources from the GEF is complicated and project approval takes a long time.<sup>28</sup> They have expressed that this has inhibited the implementation of their National Adaptation Programmes of Action and preparation of national communications. They have also drawn attention to the under-funding of the Special Climate Change Fund and the Least Developed Countries Fund, which are funded on a voluntary basis.

**Table 8.1 Status of UNFCCC funding**

| Funding source     | Commitment (\$ millions)                                       | Paid (\$ millions) | Disbursed (\$ millions) |
|--------------------|----------------------------------------------------------------|--------------------|-------------------------|
| LDCF               | \$221,45                                                       | \$169,19           | \$141,91                |
| SCCF               | \$147,77                                                       | \$110,48           | \$97,14                 |
| AF                 | \$372,0<br>(estimated availability through to 2012)            |                    | \$14,0                  |
| Green Climate Fund | 'Scaling up' from \$10 billion to 100 billion per year by 2020 |                    |                         |
| Total              | \$740,9 through to 2012                                        | \$279,67           | \$253,05                |

Source Adapted from Krishnamurthy, K., 2010. *Adaptation financing: A priority in Cancún?* Climatico Group posted on 06 December 2010. Available at: <http://www.climaticoanalysis.org/tag/adaptation/>.

One of the dilemmas is that while the rich industrialised countries recognise they have an 'obligation to compensate for the historical, current and committed impacts', the manner in which they repay and/or compensate those countries most affected appears to come with reams of conditions and limitations of what can or cannot be funded in terms of adaptation.

The UN World Economic and Social Survey in 2009 estimated that \$500 to \$600 billion is needed annually for adaptation and mitigation

in developing countries.<sup>29</sup> In a paper prepared for the Third Financing for Development Conference on Climate, and the African Ministerial Conference on Environment Special Session on Climate Change on 'revenue raising', the parties involved in the UNFCCC process advocated that funds should be 'new, additional, adequate and predictable'. History shows that developed countries have failed to live up to funding official development assistance (ODA) at the level of 0,7 per cent GNP since 1970. The likelihood that Annex 1 countries will try to conflate funding for climate change with traditional ODA is a major concern.

At the international level those principally responsible for climate change appear to be renegeing on their responsibility. In addition, the global economic crisis may place further constraints on Annex 1 countries to live up to their commitments. Therefore even if developing countries' plans were founded on the basis of sustainable development that supports social justice and environmental integrity, it is doubtful that these plans could get funding.

Climate justice groups in their policy briefs sum up the situation: 'The proposals by developed countries on adaptation offer to continue the business-as-usual-model: obtain loans from the World Bank when disasters hit, beg for aid assistance to prevent disasters, and come to the UNFCCC to be told to keep planning for adaption'.<sup>30</sup>

### ***Donor-driven interests***

Civil society climate justice groups strongly express that the 'provision of climate finance can be seen as part of reparations for the climate debt that the North owes the South. It is a legal obligation under the UNFCCC'.<sup>31</sup> Furthermore, they underline the sovereign rights and self-determination of the people of the south, implying that climate funds should not be dispersed with conditionalities.<sup>32</sup> They further stress the importance of states that have an obligation to meet climate change challenges and the public nature of climate programmes to be funded. The World Bank imposes conditionalities, such as encouraging countries to privatise social services in return for debt relief. Relevant here is the well-known Bechtel Corporation versus Bolivia water services case, in which Bechtel had raised its water rates by as much as 200 per cent.<sup>33</sup> Bechtel filed a demand for \$25 million in compensation with the World Bank International Centre for the Settlement of Investment Disputes when the Bolivian government terminated its services.<sup>34</sup>

Many governments in the global North, and the multinationals, want returns on their climate investments and impose conditions on

governments of the South in accessing funds. If funds are channelled through the World Bank they are likely to be riddled with conditions, similar to those of the structural adjustment programmes. The World Bank has a history of imposing conditions that actively privilege the private sector and private capital markets over public interests. For instance, in the water sector private-sector participation would be further encouraged and funding may be biased towards funding capital investments with the cost-recovery principle at the core of water management. Major concerns have been raised about the potential promotion of policies that ‘facilitate the control of institutions on climate finance and promote corporate profiteering from the climate crisis’.<sup>35</sup>

Powerful countries in their quest to push their position and interests in shaping a global climate agreement may use dubious tactics to strengthen their influence, such as withholding aid. Evident in the current climate change negotiations, the US is particularly vocal in pursuing the Copenhagen Accord as the next global climate change agreement, even though the US has not signed the Kyoto Protocol and the US Congress has not passed America’s climate bill. Indeed, the US has cut aid to countries that have rejected the Copenhagen Accord, such as Bolivia and Ecuador.<sup>36</sup>

Yash Tandon in his book *Ending aid dependency* categorises ‘red aid’ as aid ‘encouraging or supporting a particular ideological view point among the governments and/or the peoples of the recipient countries’.<sup>37</sup> In effect, this means that donors entrench their ideology into policy frameworks of recipient countries to the extent that when donors withdraw, the recipients continue to think the same way. Tandon explains that if the World Bank and donors exercise control over climate funds, conditionalities are likely to show an upward trend.<sup>38</sup>

### ***Challenges to mobilising domestic funds***

In the absence of a holistic adaptation plan, it is very difficult to assess the costs of adaptation. In the 2nd UNFCCC communication, the report estimated the cost of selected climate disasters between 2000 and 2009, which amounted to about R8 billion (the report admitted that this is a skewed underestimate of the broader cost to local communities and the nations of these events).

At the national level, financial constraints highlighted include the lack of information on the potential cost of planned adaptation responses to climate change.<sup>39</sup> Other constraints highlighted are the lack of preliminary assessments’ potential costs and technical and capacity

implications, with the exception of assessments conducted in some major urban municipalities.<sup>40</sup>

The treasury has proposed a carbon tax, but it is unclear if the tax is about revenue raising in and of itself, or rather as a tool to enforce behaviour change and business practice in order to avoid ecological and economic catastrophe.<sup>41</sup> If the tax is mainly for revenue raising this will have an implication for finance and water adaptation, as the finance isn't ring-fenced.

Funding climate adaptation seems to suffer from a similar deficit to funding sustainable development pathways in South Africa. There appears to be a lack of leadership in the South African government to commit sufficient resources to steer and implement the National Sustainable Development Strategy and other related policies, such as the National Waste Management Strategy. With this poor record, it is unlikely that adaptation interventions will address growing social inequalities and environmental degradation.

## **Adapting for System Change and Overcoming the Barriers to Finance**

The position and interpretation of the sustainability and development discourse may be critical in determining which types of adaptation response and development paths are supported. For South Africa to overcome the financial barriers discussed it is important that there is a significant shift in policy orientation away from cost-recovery policies to those that ensure that water is viewed as a fundamental social right and the maintenance of ecological integrity.

This will require a broader framing of adaptation to address some of the systemic challenges of consumption and production patterns in agriculture, energy, construction, manufacturing and other sectors, which are water-intensive and high emitters. Measures will need to be put in place that encourage the efficient and sustainable use of water.

Three areas for adapting to system change are explored in the following sections, not only limited to South Africa:

- Ideas for change to reduce social inequality and environmental degradation.
- The will from all sectors of society.
- The funding resources to facilitate these changes.



## Ideas for change

As stressed by Tanuro, '[a]daptation is not limited to construction or re-inforcement of infrastructures for the protection of populations (dams against floods, or the rise of the level of water, storm havens, drainage systems etc.)...' <sup>42</sup> He emphasises that climate change affects all spheres of social life and all ecosystems, and is likely to affect them even more in the future, so measures of adaptation must be taken into account in many fields. Roberts et al. concur that a broader perspective for adaptation is needed. They note that the gradual impoverishment of the larger proportion of the world's population due to climate change and globalisation is likely to make them worse off. <sup>43</sup>

Therefore, adaptation programmes cannot be developed at the whims of market interest; nor should the priorities be on 'bankable' projects. Instead, adaptation programmes need to enhance public interest and the state's obligation to ensure that the developmental needs of its citizens are met, particularly the poor and vulnerable, through actions that are sustainable, equitable and people-centred. This will mean fundamental changes in management of water resources, town and country planning, agriculture, forestry, energy generation, public health, transport, environmental policy, dietary habits and insurance against risk, among others.

## The will to facilitate change

It is widely accepted that developed countries are responsible for paying for the ecological debt they incurred and their historical contribution to climate change. In the words of climate justice groups, '[t]hose who owe climate debt must pay for reparations to all the countries and peoples of the South...' <sup>44</sup> Even if the North pays the debt to the South, this ecological crisis must be seen as a consequence of a capitalist production and consumption system and requires that developed countries and the elites in developing countries drastically change unsustainable consumption and production patterns. Therefore, adaptation linked to mitigation must shift the boundaries to make broader systemic changes that address the well-being of all and aim for a socially and ecologically just society. The change requires the will of all sectors of society, but the onus is particularly on the government to instigate shifts towards socially and ecologically sound policies.

## Funds to facilitate change

The commitment to disburse funds from the North and access to funds from the South in the multilateral apparatus is a highly contentious issue. Although a Global Climate Fund was established, the governance of this fund is currently being debated. It is important that the fund be governed by the UNFCCC as opposed to the World Bank because under the latter adaptation may be subject to a range of conditionalities, and programmes pursued may in all likelihood lead to maladaptation.

A world fund for adaptation of developing countries should not only address the inevitable effects of climate change, but also ensure the transfer of cleaner technologies to the public sector of these countries without financial conditions.<sup>45</sup> Financing this fund should come from taxing the profits of the economic sectors most responsible for climate change (i.e. oil, coal, cars, electricity generation, etc.), financial transaction taxes, shifting fossil-fuel subsidies and other innovative means. It is important that these funds are in the form of grants and not loans. This is because developed countries are obligated to provide climate finances from public sources as a consequence of their historical responsibility for causing the climate crisis. Furthermore, if funds were in the form of loans it is likely to increase indebtedness of developing countries, and particularly if the World Bank facilitates climate finance these loans are likely to come with conditions.

## Conclusion and Policy Considerations

In conclusion, if the approach to adaptation is narrow and addresses impacts through technical measures, training and awareness raising primarily at the community level without improving people's socio-economic needs, then adaptation is likely to make communities less resilient. On the other hand, if adaptation is considered more broadly in terms of changing unsustainable consumption and production patterns of industry and the wealthy and middle classes, and in terms of natural-resource use, while at the same time addressing the inequalities of urban and rural communities, then communities and nature are likely to be more resilient to the accumulated greenhouse gases.

Therefore, the following policy considerations for the water sector to overcome some of the financial barriers discussed need to be taken into account:

- An overhaul of water policy that ensures water is a fundamental human right and not a commodity for profit, thereby changing water policies and placing financial resources to promote social and ecological integrity in water use and management.
- Obtaining financial resources to encourage systemic changes through public funds and innovative means, such as financial transaction taxes, taxing the profits of the economic sectors most responsible for climate change (i.e. oil, coal, cars, electricity generation, etc.) and shifting fossil-fuel subsidies, among others.
- Broadening the scope of funding to focus on the impacts of unsustainable consumption and production patterns rather than predominantly reducing vulnerability. For example, funding that supports agro-ecological production, as opposed to funding irrigation programmes that encourage large-scale, capital-intensive industrial agriculture.
- Finally, international funds to support adaptation in the water sector must be governed by the UNFCCC so that countries can impress their sovereign rights and the self-determination of their people to address the challenges posed by climate change.

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# 9

## Technology barriers to climate change adaptation implementation in the SADC region

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### Introduction

Sufficient evidence exists that climate change has drastically altered climatic conditions by exacerbating dry conditions and increase flooding in areas that have never been exposed to these conditions before.<sup>1</sup> These effects have already emerged in Southern Africa; examples include the floods in Mozambique and South Africa in 2011. What is apparent is that poorer countries are more prone to climate change effects than wealthy countries, which have the resources and capacity to adapt to climate change.

The fourth assessment report of the Intergovernmental Panel on Climate Change (IPCC) indicates that even though the Kyoto Protocol may be fully implemented, the acute impacts of climate change will take a while before being fully realised. The report singles out Africa as one of the most vulnerable continents because of its low adaptive capacities and other factors, including fragile national economies.<sup>2</sup> Many African states are dependent on climate-sensitive economic sectors, such as rain-fed agriculture, ecosystem-based enterprises (like fishing) and rain-fed farming.<sup>3</sup> Food scarcity, therefore, makes Africa extremely vulnerable to climate change.<sup>4</sup> With this concern there is a consensus that the Southern African Development Community (SADC) economic region, just like other African economic regions, such as the East African Community and the Economic Community of West African States, is

not immune to climate change.<sup>5</sup> Notably, the Southern African region has limited capacity to cope with the challenges of climate change, mainly as a result of:

- limited technology options for adapting to climate change,
- lack of coordinated directions on mitigation strategies and options,
- high levels of illiteracy among technology adopters and users,
- high population growth rates that make it difficult to catch up with human-development demands,
- ever increasing poverty,
- insufficient institutional frameworks for climate change adaptation and mitigation and
- lack of infrastructure to support deployed technologies.

These are further fuelled by a lack of skills to maintain deployed technologies; social and cultural barriers that limit the adaptation of modern technologies; lack of political will on the part of governments to invest in research to develop new technologies; and a shortfall in the match between adopted technologies and their understanding by adopters and users. All these factors hamper the adoption and use of modern technologies to adapt to climate change. In addition, the inherent burden of licensing and other intellectual property requirements serve as a single barrier that thwarts the adoption of technologies needed for climate change adaptation. It can be seen, therefore, that the main goal for discourse on climate change adaptation implementation should be to advance the development of a systematic framework to identify and minimise barriers that are linked to adaptation processes and challenges.<sup>6</sup> Systematically identifying barriers to climate change adaptation will advance the understanding, and assist in the decision-making process, of adopting appropriate technologies.

This chapter identifies some of the technological barriers to climate change adaptation implementation. In identifying these, special reference has been made to SADC countries. Empirical evidence from secondary sources has been used to support arguments raised. This means that the chapter is based on existing information that confirms climate change adaptation implementation is somehow obstructed by certain barriers that are directly linked to technologies. In drawing this conclusion, a systems dynamics technique was used to make deductions. This technique is a thinking model, specifically developed for this purpose.



In general, a system dynamics technique is used to interpret the dynamic behaviour of complex systems. In applying this technique it was considered that the effects of climate change are complex and unpredictable and thus constitute a complex system whose impacts need to be analysed and interpreted in various ways. Through system dynamics, climate change has been presented as a phenomenon that results from a series of directly and indirectly interacting events, whose combined effects are either expressed through droughts, unpredictable weather patterns or flooding.

A hypothesis that human attempts to adapt to climate change are restricted by technology barriers was tested, with the main causal factors considered as being a lack of skills to maintain the deployed technologies; social and cultural barriers that prevent the acceptance and adaptation of modern technologies; lack of political will on the part of government to invest in relevant technologies; and a general mismatch between technologies and the users' understanding of them.

## **Assessment of SADC Countries' Readiness to Tackle Climate Change through Technology Adoption**

The instrument that has been used so far by SADC states to assess their readiness to tackle climate change through technology is the technology needs assessment handbook jointly developed by the UN Development Programme and the Global Environmental Facility Secretariat.<sup>7</sup> Technology needs assessment entails the identification and evaluation of technical means for achieving a country's specified ends.<sup>8</sup> From a climate change and development perspective, technology needs assessment seeks to prioritise technologies, practices and reforms that can be implemented by a country to reduce greenhouse gas (GHG) emissions and climate vulnerability, and to contribute to development goals. What this suggests is that technology needs assessment as a means by which development and climate response needs and opportunities are brought together and integrated (see Figure 9.1).

Records, in the form of technology needs assessment reports, demonstrate that all SADC countries have assessed their climate change technology needs. What is obvious from the assessments are the levels of disparities that exist between countries.<sup>9</sup> This is due to the different efforts that have so far been undertaken by member states in investing in research and technology development. From the assessments, it seems

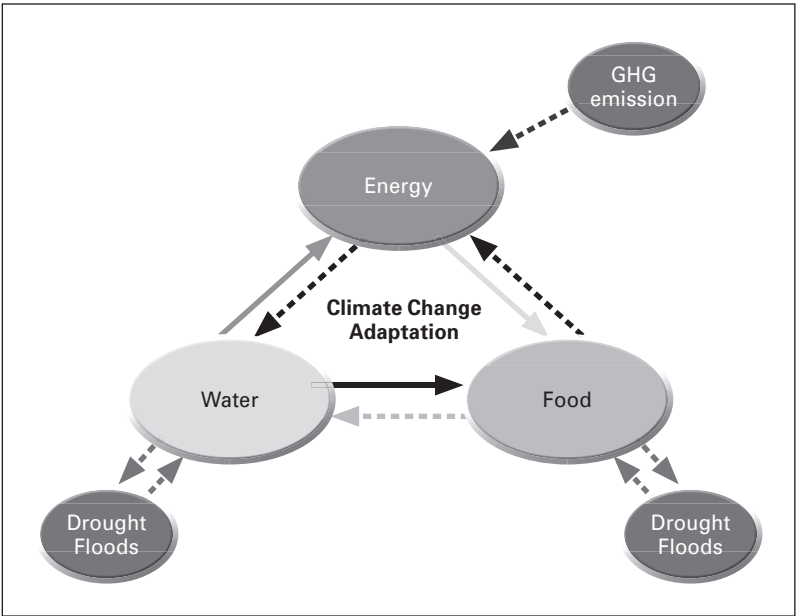
as if it will not be easy to adopt a single regional approach to climate change adaptation implementation, and this alone is a major barrier to adaptation implementation in the SADC region.

**Major Technology Barrier Faced by SADC Countries**

What is obvious with climate change adaptation implementation is that a concerted effort to control or reduce climate change needs to be centred on reducing GHGs and assisting people to use alternative sources of energy (see Figure 9.1). This comes from the observation that conventional energy sources (i.e. fossil fuels) are the main cause of climate change.

In attempting to migrate from fossil fuels to renewable sources of energy the biggest hurdle is to develop policies that are based on ready-to-use technologies. SADC, like other African regions, is heavily reliant on these technologies that have been developed elsewhere. Such technologies carry the burdens of cost and lack of understanding by

**Figure 9.1 Areas where countries will have to assess their technology needs to achieve a balanced approach to climate change adaptation**



communities. They normally fail to make the desired impact due to their rejection by communities. This appears to be a particular barrier worth consideration, especially by developing countries within SADC.

## **Technology Options Available to SADC Countries**

### **Biomass conversion**

A major technology source that has been harnessed by many African countries and still holds a big potential for the continent is bioenergy, or biomass. Biomass is widely used to generate electricity, heat homes, fuel vehicles and provide process heat for industrial facilities. Biomass is any hydrocarbon material that consists of carbon, hydrogen, oxygen and nitrogen.<sup>10</sup> This chemical composition is important in the development of technologies to derive energy from biomass. In general, conversion routes of biomass lead to the production of heat, electricity and fuel.

Broadly, there are two types of technology for generating energy from biomass: thermochemical conversion and biochemical conversion. The thermochemical technologies involve heating biomass at different temperatures and with different air content to change its content so as to yield energy. The most common thermochemical conversion processes are pyrolysis and gasification.<sup>11</sup>

### **Pyrolysis**

This is one of the oldest technologies used to derive power from biomass. It can be traced back to the ancient Egyptians, who used the process to produce tar for boats.<sup>12</sup> Pyrolysis involves burning biomass with limited air (oxygen) to yield charcoal and volatile matter in particular gases, which can be used to provide energy. There are three broad categories of pyrolysis: conventional pyrolysis, which involves slow heating that results in the production of a higher content of charcoal than gaseous energy products; fast pyrolysis, which involves the rapid heating of biomass at high temperatures in the absence of air, especially oxygen, which results in the production of higher quantities of liquid and gaseous products than charcoal; and flash pyrolysis, which involves instantaneous heating, and is still in the development phase.

Pyrolysis conversion technology has been improving steadily. Researchers have found that varying the amount of air and the process temperature influences the quantity of solid fuel (charcoal or char),

gas fuel and liquid fuel (tar) produced. Pyrolysis produces energy fuels with high fuel-to-feed ratios, and the most efficient biomass conversion processing has the potential to produce fuels that will compete with and eventually replace non-renewable fossil fuels.<sup>13</sup> Conventional pyrolysis remains the most widely used technology in the SADC region due, in part, to a lack of concerted effort by governments to encourage and facilitate the adoption of improved bioenergy technologies.

### ***Gasification***

Gasification is another old, but ever improving technology that is used to extract energy from biomass. This thermochemical conversion technology converts carbonaceous biomass into combustible gas, called producer gas, and small quantities of tar and ash. The process uses very high temperatures to maximise gas production.<sup>14</sup> The producer gas can be used to provide industrial power, generate heat and for fuelling vehicles. In the World War II period almost a million gasifiers were used to fuel cars, trucks and buses.<sup>15</sup> The momentum for gas fuels from biomass declined as the cost of fossil energy decreased. Recent concern about the use of non-renewable fossil energy has, however, brought new interest in gasification. The main purpose of biomass gasification remains the production of low or medium heating value gas that can be used to generate heat and electricity by direct firing in engines, turbines and boilers.<sup>16</sup> Gasification can also produce other fuels, like methanol and hydrogen. Hydrogen is envisaged to play a prominent role as vehicle fuel in the future. However, hydrogen as a fuel has high handling costs, which makes its use as a fuel uncompetitive. Of notable importance in terms of gasification is the Fischer-Tropsch synthesis technology, which produces biofuels and green diesel from biomass.<sup>17</sup>

One disadvantage of the gasification process is that it produces tar, a complex mixture of chemical elements, which requires yet another processing technology to reduce its output, otherwise tar makes the gasification process suboptimal. Moreover, the gasification process creates product quality and composition that are unpredictable owing to the many independent variables that ultimately determine the output. These include fuel composition, gasifying medium, operating pressure, temperature, moisture content of the fuel and the mode of bringing the reactants into contact inside the gasifiers.<sup>18</sup> South Africa is the only country in the SADC region where there is some recorded progress in the use of gasification to produce biofuel; nonetheless, the technology is still in its infancy.

## Hydro energy

Hydro-energy technology is mainly in the form of dams or concrete barriers across flowing waters, that create a reservoir and subsequently release the water in controlled form to maximise the kinetic energy of the flow. This kinetic energy is then used to turn turbines that feed into a generator, then a converter or inverter, and finally a transformer converts the energy into electricity. This electricity is then connected to a grid and distributed. The electricity generated is proportional to the pressure head and volume flow rate. It is also dependent on the mechanical power produced at the turbine shaft, the hydraulic efficiency of the turbine, the density of water, the acceleration due to gravity, the volume flow rate passing through the turbine and the effective pressure head of water across the turbine. The major hydropower stations in the SADC region are Cahora Bassa HPS in Mozambique (2 075 MW) and Kariba HPS in Zambia/Zimbabwe (1 320 MW). Innovation in the conventional hydro-power conversion technologies has focused on the design of turbines and efficiency improvement in energy transmission and conversion.

An alternative technology for hydropower generation that is being spearheaded by South Africa is the pumped water storage approach, whereby two reservoirs are used. Water from a natural source is stored in both reservoirs. To generate power, water flowed from the upper reservoir to the lower reservoir via two reversible pump/turbines and hydropower is generated in the process. During off-peak periods, the water collected in the lower reservoir is pumped back to the upper reservoir using the generated power from the down-flow of the water. The pumped water storage technology converts excess hydropower into kinetic energy during off-peak energy demand periods, and then reconverts the kinetic energy into hydropower during peak demand periods. The South African experience indicates that pumped water storage can be replicated successfully in other Southern Africa countries without big rivers.

## Wind energy

The process of harvesting energy from wind broadly includes the conversion of the force of wind; kinetic energy acting on rotor blades; and rotational energy converted into torque, or mechanical energy. Rotational energy is used either with generator electricity or to directly move machines or equipment such as mills or water pumps. The intermittent energy of wind necessitates means of storing energy at peak

time to be used during off-peak periods. Intermittence of wind energy also means that for practical use, the energy has to be supplemented by other energy sources, like hydropower, to cater for periods of low-feed kinetic energy. The need to supplement wind energy with another energy source to make it reliable is a major disadvantage of this technology in energy-starved areas. Wind energy conversion technologies have focused on maximisation of energy transformation and transmission from kinetic to rotational energy through to electricity, as well as increasing efficiency in storing the generated energy.

Although wind-conversion technology is relatively easy to master with low maintenance costs, wind plants require high initial investment to the extent that for such projects to be economically viable there should be a significant demand for energy to be produced. Without a significant demand to support the energy produced, the project is not likely to break even in the estimated 15-year project lifetime. By implication, small projects for harvesting wind energy are less likely to be economically and financially viable. Moreover, wind energy conversion projects are location-specific. There needs to be sufficient wind to keep the rotors moving. In SADC, wind energy conversion projects are only feasible in areas of high power demand. This requirement of ensuring enough wind makes wind energy unfeasible for landlocked SADC countries in the foreseeable future.

## Solar energy

The application of solar energy conversion technologies for heating and deriving electricity, particularly at household level, is well established across the region. The technology can be divided into two categories: solar electric or photovoltaic systems and solar thermal systems. Photovoltaic technology generates electricity from solar power to use in a wide range of devices, including water pumping, and solar thermal systems mainly from tapping heat from the sun.

Photovoltaics are made up of solar cells made of purified silicon and connected in series. They use chemical-electrical interaction between light radiation and semi-conductors to obtain direct current electricity. The energy produced is dependent on the sunshine intensity, hence their output varies with the sun's intensity. A typical solar module comprises 36 cells connected in series to produce an operating voltage of 12 volts. Conversion technology for solar energy has focused on improving the efficiency of solar cells.

Solar thermal systems are composed of solar thermal plants, solar water heaters, solar drying, solar cookers, solar distillers and solar coolers. Solar thermal plants use complex concentrations of solar collectors to produce temperatures high enough to produce steam to drive electricity-generating turbines. The concentration systems fall into the category of point-focus concentrators, such as central receiver systems and parabolic dishes, or line-focus concentrators, like the parabolic-trough collectors.<sup>19</sup> This technology is still under development and has not been applied on a commercial scale.

Solar water heating involves having a solar heat collector and a water-storage facility. A transmission means is created to transfer heated water to the water-storage facility while allowing cold water to flow to a solar heat collector. Solar drying is the simplest and most widely used solar process. Its main application is for drying agricultural produce. It basically involves exposure of the product to solar heat. Generally, there has not been significant progress in this technology so far.<sup>20</sup> Progress in the use of solar energy in the SADC region has been constrained by the high initial set-up costs of the solar-energy-tapping infrastructure. The initial costs are out of reach of the average citizen. Regional governments ought to devise some form of subsidies to mitigate the initial cost of converting to solar energy use. South Africa is offering subsidies for the installation of solar water geysers.

## Identified Barriers

### Broader considerations

The extent to which renewable energy technologies are likely to contribute to addressing climate change needs to be explained in the broader context.<sup>21</sup> The input of renewable energy technologies in mitigating climate change has been undermined by bad experiences, misinformation, pushing technologies and the consequent negative perceptions. An imbalance between energy services for meaningful economic growth and general welfare gains appear to be a source of conflict among technology users.<sup>22</sup> Certain technologies have been disseminated in circumstances that compromise their further adoption, as beneficiaries have been dissatisfied with their performance. This mismatch between technologies and their acceptance by users has stalled the promotion of such technologies as a means to adapt to climate change.<sup>23</sup>

## **Biomass conversion technology**

A key prerequisite for biomass conversion technology is the existence of bio feedstock. Biochemical technologies can be viable at the small household level as long as the household can generate or source the feedstock. The initial investment is not high and the technologies do not require specialised operating skills. These technologies are applicable in the upper Southern African countries and countries across the African equatorial belt.

It should be noted that biochemical conversion technologies are often water-intensive so as well as reliable supply of bio feedstock, access to water is critical for these technologies. Thermochemical conversion technologies, however, are fairly sophisticated technologies with high start-up costs and require specialised skills, making them unfeasible for small-scale production.

## **Hydropower**

A prerequisite for hydropower conversion technologies is a reliable natural water source. As such, these technologies are most relevant to African countries that have permanent stream flows. In Africa, these include Southern African countries that share the Orange River, Eastern Africa countries that share the Nile, the Congo Basin countries and Western African countries that have rivers flowing to the Atlantic, like the Niger River.

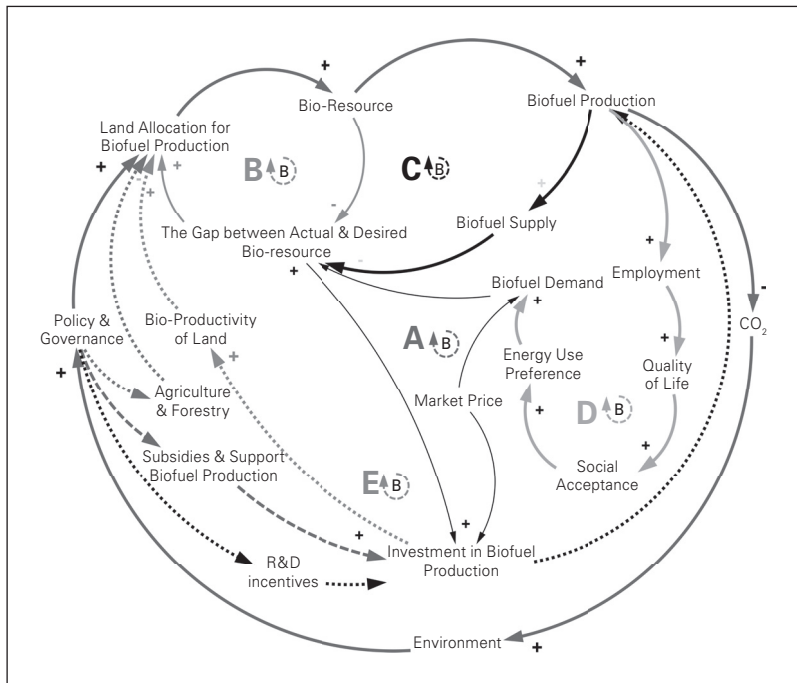
Hydro-energy conversion technology is most feasible in large-scale operations. This is due in part to the high initial set-up costs of hydropower projects. This explains why hydropower stations are mainly situated on major rivers. Technology for micro-hydropower stations is also available. It consists of a scheme that diverts water from a river using a dam or weir. The water is transported to the forebay using a canal or pipeline. From the forebay the water is taken to the turbine by the penstock. The turbines drive a generator either directly or by means of mechanical transmission. Although micro-hydropower conversion technologies are available and mature, overall, the undertaking of micro-hydro power generating projects is not yet competitive.

## **Barriers to Biofuel Production**

Although major technical breakthroughs have been achieved internationally with respect to alternative technologies for climate change



**Figure 9.2 Techno-socio-economic model for biofuel production**



adaptation, their contribution remains minimal in many African countries. To increase their contribution major barriers to the wider dissemination of technologies needs to be overcome.<sup>24</sup> These are multidimensional, and include policy, regulation, the institutional framework (see Figure 9.2) and many others, which requires a coordinated approach.<sup>25</sup>

Policy pertaining to biofuel production, as one of the alternative technologies to promote adaptation to climate change may seem simple, but it has diverse and complex ramifications.<sup>26</sup> There are both techno-economic and techno-social dimensions that may act as barriers. This technology interfaces with the environment via carbon-emission reduction, the extent of which may be determined by available and applicable technology. The state of the environment (either improving or deteriorating) has a direct bearing on people's welfare, which, in turn, influences future policy on biofuel production (see Figure 9.2).

Complexities pertaining to biofuel production and its technosocio-economic dimensions have received little attention within the wider context of understanding the opportunities and challenges of

the shift from the use of fossil fuels to renewable energies as a mode of adapting to climate change. To illustrate the complexities of biofuel production and to assess the techno-socio-economic imperatives and its possible acceptance by users, a high-level causal loop model that captures the major aspects of the biofuel production process is presented (Figure 9.2).

The first issue to consider is that good governance and policy regime within a country can be major drivers of biofuel production and use. However, the starting point of the analysis is governance and policy. Assuming that there is no land constraint, more land allocated to bio production may lead to an increase in biofuel production. An increase in biofuel production and use may then reduce CO<sub>2</sub> emissions, thus improving the environment. Improved environmental conditions, in turn, influence future policy on land allocated to biofuel production. This relationship is outlined in the first (outer) closed causal loop of the biofuel production dynamics in Figure 9.2. The direction and extent of the influence of the environmental condition on land allocated to biofuel will also depend on the delicate balance between allocating land for food and for bio resource production. This balance is particularly relevant in cases where food and biofuel production compete for the same land.

The second relationship relates to land allocation and biofuel production, which increases the bio resource. Bio resource in this case refers to the stock of all bio inputs used in biofuel production. Increase in bio resource reduces the gap between actual and desired bio resource stock. This relationship constitutes another closed, but counter-balanced loop (loop B in Figure 9.2).

The third main feedback loop relationship starts with land allocated to biofuel production, which then increases bio resource. The availability of more bio resource will lead to higher biofuel production. Increased biofuel production leads to job creation (other factors remaining constant). This benefit is key to the acceptance of the technology by communities. Jobs improve the quality of life of those employed in biofuel production, with positive externalities to communities where the employed people reside. Improved quality of life will, therefore, lead to social acceptance of biofuel production as a technology for climate change adaptation.

This acceptance will eventually increase the demand for biofuel. This increase will widen the gap between actual and desired bio resource, which, in turn, influences future land allocated to biofuel production.

This feedback causal process is shown in loop C. This loop is particularly important because it links production, which is a technical aspect, to employment, which is a socio-economic aspect, and society preference, which is a social aspect. This loop encapsulates the techno-socio-economic dimension of biofuel production.

Another closed causal relationship involves land allocation, biofuel production, the increase in bio resource and the increase in biofuel production. Biofuel production will increase the supply of biofuels, which will narrow the gap between actual and desired bio resource. The narrowed gap between actual and desired bio resource will lead to less land being allocated to biofuel production, other factors remaining constant. This is represented by the closed causal loop D.

The last closed causal loop identified in the biofuel production process relates to investment decisions. Land allocated to biofuel production influences bio resource stock. Bio resource stock has an effect on the gap between actual and desired bio resource. This gap feeds into investment decisions in biofuel production, in conjunction with other factors. Investment in biofuel production has a positive effect on land productivity. Land productivity influences the land allocation for biofuel production. This investment feedback process is shown in loop E.

What is clearly apparent in this model is that when it comes to renewable energy resources, investment plays a dual role. On the one hand, it can increase the production efficiency via improved technology. On the other hand, it increases the supply resource input by increasing the bio-resource productivity of land. What should be noted from this analysis is that although it is based on assumptions, the highlighted barriers may be true and logical for the acceptance and rejection of any technology deployed as a means to adapt to climate change. It, therefore, provides a basis for assessing the complex nature of climate change adaptation and technology deployment.<sup>27</sup>

## Selected Case Studies

A study by Amigun et al.<sup>28</sup> on communities' perceptions on the large-scale biodiesel production facility in South Africa's Eastern Cape found that community opinions on the construction of the facility were opposed to the biodiesel production chain. The concerns raised varied, but the major issues were land availability, infrastructure development, associated pollution, food security and the distortion of the social fabric of local communities.

On the other hand, Practical Action Consulting<sup>29</sup> has reported that in the Tanga region of Tanzania, sisal is being produced as an important cash crop. Using current production methods, 4 per cent of the plant is recovered as fibre; the residue is either burnt, producing CO<sub>2</sub>, or rotted naturally, producing methane. At Katani Ltd., a sisal-growing and processing company, this residue is converted into biogas and then electricity, which is used to power the factory. Further plans are in place to double the power output from 150 kW to 300 kW, and develop biogas for vehicles and piped household fuel. Katani has strong social interests and has transferred land to local farmers on which they grow the sisal the company buys. The increased income has enabled the community to build better houses and buy bicycles, mobile phones and better clothes, and gain access to electricity and cleaner drinking water. Electricity is used to provide light for work in non-daylight hours and to run small-scale industries, which may subsequently increase incomes.

Another case study reported by Practical Action Consulting<sup>30</sup> that is proving to be successful is happening in other parts of the continent, including Mali. The Garalo Project in Garalo Commune was established to provide the local community with access to electricity produced from jatropha oil. Small-scale farmers are at the heart of the business model, supplying jatropha oil to a hybrid power plant. Electricity is then sold by the private power company Access to residential and business consumers. Out of a forecast of 10 000 hectares of jatropha, 600 hectares, involving 326 rural families, are being cultivated on land previously allocated to cotton – a product that has significantly dropped in market value over recent years. The project provides a stable income to farmers as well as access to modern energy services for the community, both of which have stimulated the local economy. Furthermore, producer and consumer rights have been promoted through the establishment of co-operatives and associations.

These case studies, and many others<sup>31</sup> in existence, provide contrasts, representing the rejection or acceptance of bio technology. In cases that prove successful, tangible benefits are the main determinant of the acceptance of technology; in the case of those that are rejected perceptions of the potential loss of land and identity appear to be the key drivers.<sup>32</sup> How these projects integrate to yield an outcome of acceptance or rejection of technology has been demonstrated through the causal loop model in Figure 9.2, which shows that biofuel production as a socio-technical approach to climate change adaptation can

be a complex system, which if not deployed appropriately may fail to achieve the desired objectives of promoting climate change adaptation implementation.<sup>33</sup>

## Conclusion and Policy Considerations

As the world faces the realities of climate change, the development of adaptation strategies has become more critical. Implementing these strategies requires cooperation at local, regional and international levels. In addition, the adoption of relevant technologies seems to be appropriate in promoting climate change adaptation implementation. However, adoption has been found to be limited by numerous barriers that stem from a) limited technology options for adapting to climate change; b) lack of coordinated directions on mitigation strategies and options; c) high levels of illiteracy among technology adopters and users; d) high population growth rates that make it difficult to catch up with human development demands; e) ever increasing poverty; f) insufficient institutional frameworks for climate change adaptation and mitigation; and g) lack of infrastructure to support deployed technologies. In reducing the impact of these barriers and their root sources it has emerged that SADC member states should adopt a holistic approach to climate change adaptation implementation, as barriers are likely to emerge at all levels of climate change adaptation implementation. This has been observed from the fact that climate change adaptation technologies encompass a heterogeneous mix of socio-technical systems, which may be easily affected by associated barriers.

Technologies for climate change adaptation offer an important opportunity for development. What has been shown in this chapter is that these technologies have the potential to contribute directly to sustainable development if not restricted by associated barriers.<sup>34</sup> Mitigating the effects of climate change through the adoption of some of these technologies will certainly reduce the associated effects of climate change and provide incremental financial benefits to communities. Although it is obvious that some of these technologies, such as hydropower and solar and thermal energy, have great potential for promoting adaptation to climate change, they need to be introduced to communities through approaches and policies that will promote their adoption and acceptance.<sup>35</sup> Through this approach there is hope that their adoption will have the overall effect of reducing climate change. In selecting technologies to be deployed it would be important to ensure that they do not

have the inherent burden of licensing and other intellectual property requirements, which may prove to be barriers.

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# Technological barriers to climate change adaptation

## The case of Mozambique

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### Introduction

According to the Intergovernmental Panel on Climate Change (IPCC) fourth assessment report, there is no doubt that the climate system is warming. This is evident from observations of increases in the global average air and ocean temperatures, widespread melting of snow and ice, and the rising global average sea level.<sup>1</sup> Observational evidence from all continents and most oceans show that many natural systems are being affected by regional climate changes, particularly temperature increases. Global greenhouse gas (GHG) emissions due to human activities have grown since pre-industrial times, with an increase of 70 per cent recorded between 1970 and 2004. Global atmospheric concentrations of carbon dioxide, methane and nitrous oxide have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years. Most of the increase in global average temperatures since the mid-twentieth century is very likely to be caused by an increase in anthropogenic GHG concentrations, with a significant average anthropogenic warming observed over the past 50 years in each continent (except Antarctica). There is growing agreement, and much evidence, that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to rise over the next few decades. Continued GHG emissions at or above current rates will cause further warming and induce many changes in the global climate

system during the twenty-first century, which are likely to be more pronounced than those observed during the twentieth century.

So far, the focus of the international community as far as climate change is concerned has been on mitigating climate change by reducing GHG emissions. However, for many poor communities in developing countries, mitigation is not the most pressing issue. Climate change is already having an impact on these communities, and what they now need is ways to adapt to it.<sup>2</sup> The early studies into the impacts of climate change used global circulation models in a top-down manner to predict scenarios in different places. Based on these results, the next phase of research used a more bottom-up approach to identify the places, activities and communities most at risk. These, in turn, led to a third phase of studies that use both sets of information to develop plans for how those affected can best prepare and adapt. None of these studies has yet progressed beyond theoretical analysis. The next phase of research must be linked actively to the people whose lives will be affected, and researchers must learn from doing. In other words, researchers need to work with the people who will use their research, right the way through from designing a project to implementing it and communicating its findings. Those users will include national policy makers and planners responsible for adaptation matters. They also include local governments, aid workers and non-governmental organisations that are working on adaptation at the community level.

Due to its geographic location, Mozambique is particularly vulnerable to climate change impacts. Therefore, the development of adaptation capabilities to deal with climate change impacts in Mozambique is of paramount importance. This chapter makes reviews the situation in Mozambique in terms of vulnerability to climate change, outlines major adaptation strategies for climate change and identifies major technological barriers for climate change adaptation.

## **Analysis of Natural Disaster Occurrences in Mozambique**

Mozambique is located on the south-eastern Indian Ocean coast of Africa, bordering on the Tanzania to the north, Malawi, Zambia and Zimbabwe to the west and Swaziland and South Africa to the south. It is located between latitudes 10 and 27 degrees south and between longitudes 30 and 41 degrees east. The country's surface area is 799 380 km<sup>2</sup>, with a coastline of about 2 800 km. Mozambique is divided into 10 provinces, each with a provincial capital; Maputo is the national capital with the administrative status of a

**Map 10.1 Mozambique: Geographic position and administrative divisions**



province. The 10 provinces (excluding Maputo City) are subdivided into 128 districts. These districts are further divided into administrative posts and these into localities, which is the lowest geographical level of state

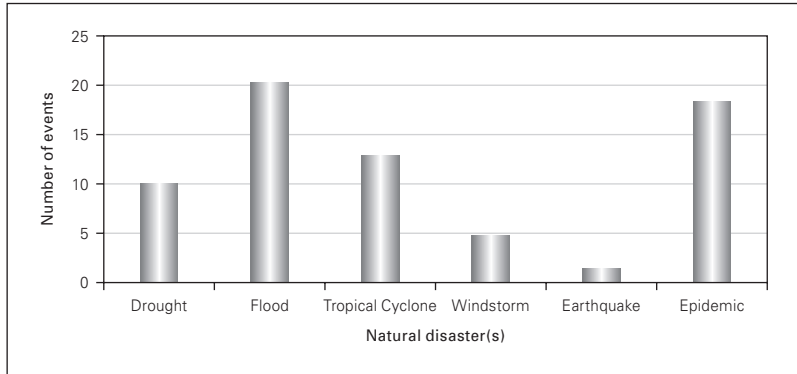
administration. For certain purposes, the country is considered as three regions – northern, central and southern regions. The northern region comprises the provinces of Cabo Delgado, Niassa and Nampula; the central region comprises the provinces of Zambézia, Tete, Manica and Sofala; the southern region includes the provinces of Inhambane, Gaza and Maputo. Map 10.1 shows the geographic position of the country and its administrative divisions. According to the preliminary results of the 2007 census, the total population of Mozambique is 20 530 714, with more than 1 million people living in the capital, Maputo. Approximately two-thirds of the population lives in rural areas grouped in small communities throughout the country.<sup>3</sup>

Extreme climatic events in the form of floods, droughts, cyclones and sea-level rise are already affecting a large number of people in Mozambique. Mozambique has experienced seven droughts in 10 years in its southern region and four droughts in 10 years in the central region. About 200 000 people are affected by floods every two years, 1 million people every 50 years and 1,5 million every 100 years. This is exacerbated by the fact that Mozambique is at the receiving end of nine international hydrographic basins. In addition, there are approximately three to four cyclones every year. These are likely to increase in terms of their frequency and magnitude with climate change.

The national natural disaster database for Mozambique is compiled by event type, and recorded information includes the number of people killed/affected and economic losses.<sup>4</sup> Natural disaster types included in the database include droughts, floods, tropical cyclones, wind storms, epidemics and earthquakes. The information is derived from a variety of sources – two national sources covering the period 1980–2008, the National Institute for Disaster Management (or *Instituto Nacional de Gestão de Calamidades* [INGC]) and the Famine Early Warning Systems Network; and four international sources covering a more extended period (the Emergency Disasters Database, the Global Disaster Identified Number, the British Association for Immediate Care and the Munich Reinsurance Company). These cumulative databases cover the period 1956–2008. The main disaster events affecting Mozambique are weather-related phenomena associated with outbreaks of epidemics.<sup>5</sup> The historical database shows that the four events most likely to occur in Mozambique are floods, tropical cyclones, droughts and epidemics. This means that major natural disasters affecting Mozambique are almost exclusively related to climate. Figure 10.1 shows the frequency distribution of natural disasters in Mozambique from 1956 to 2008.

One crucial question alongside the climate change issue is whether or not the number of natural disasters is growing. The answer to this

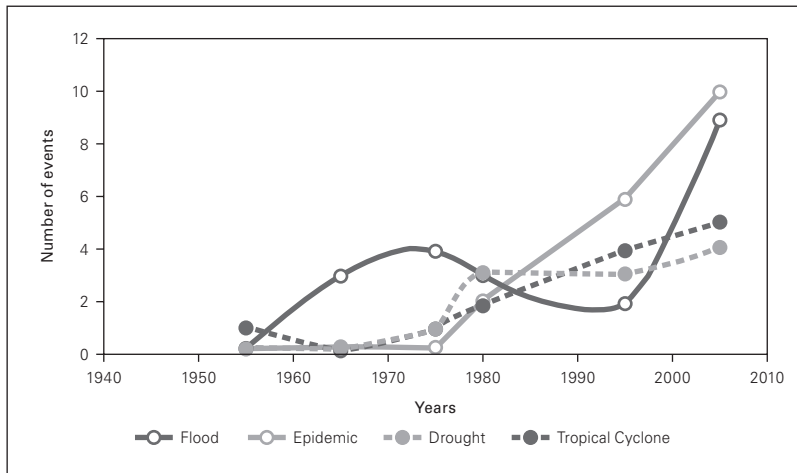
**Figure 10.1 Frequency distribution of natural disasters in Mozambique, 1956–2008**



Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

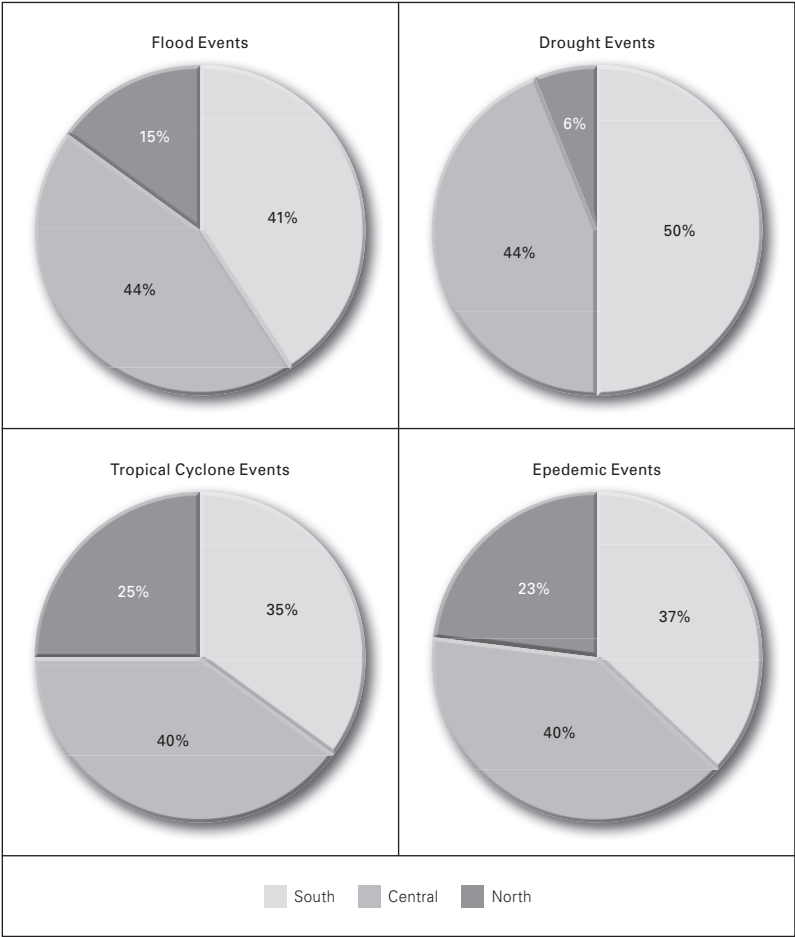
question needs a careful analysis given the lack of homogeneity in data about natural disasters and the technological problems in collecting data. Since the 1980s data-collection methods have improved worldwide, and one can observe an increasing number of events during the last three decades. Figure 10.2 shows a significant increase in the

**Figure 10.2 Historical trends of natural disasters in Mozambique, 1956–2008**



Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

**Figure 10.3 Total number of the four common events per region**



Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

number of disasters since the 1980s, with a growing rate of floods and epidemics marking the last two decades of the twentieth century and the first decade of the twenty-first.

For a better understanding of the level of vulnerability by region (south, centre and north), the total number of events by disaster type is described for different regions (see Figure 10.3). It can be observed that the centre is the most disaster-prone followed by the south; the north is likely to have fewer disasters.

According to the database, floods are more common in the centre and south, and tropical cyclones affect the centre and south. Droughts occur more frequently in the south and centre of the country, with epidemics likely to affect the centre and the south. The north is less prone than other regions. It is noted that tropical cyclones and epidemics are matter of concern in this region.

The main impacts of natural disasters are expressed by the number of people killed and affected, and damage in terms of economic losses. It is important to note that there is a lack of information and reliability of the economic losses included in the database. This is mainly because information and communication technology in most areas of the country is very underdeveloped. There are no systems for local registration and posterior communication of information to the relevant authorities. Most of the time the figures are measured by the amount of aid requested by the country to cover the basics needs after a disaster has occurred. Table 10.1 lists the top ten deadliest disasters in Mozambique between 1956 and 2008. The long-lasting drought from 1981 to 1985 killed many thousands of people across central and southern Mozambique. This was

**Table 10.1 Top ten natural disasters, by number of deaths**

| No | Disaster Type | Year      | Location                                                                                                                             | Number of Killed |
|----|---------------|-----------|--------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1  | Drought       | 1981/1985 | Maputo, Gaza, Inhambane, Manica, Sofala and Zambezia                                                                                 | 100 000          |
| 2  | Flood         | 2000      | Maputo (Matutuine, Manhiça, Magude and Marracune), Gaza (Mabalane, Chokwé, Chibuto, and Xai-Xai), Inhambane, Sofale, Manica and Tete | 800              |
| 3  | Epidemic      | 1997/1998 | Maputo City, Maputo, Gaza, Inhambane, Manica, Sofala, Tete and Zambezia                                                              | 619              |
| 4  | Epidemic      | 1990      |                                                                                                                                      | 588              |
| 5  | Epidemic      | 1992      |                                                                                                                                      | 587              |
| 6  | Flood         | 1971      | Zambezia Region                                                                                                                      | 500              |
| 7  | Flood         | 1977      | Gaza                                                                                                                                 | 300              |
| 8  | T. Cyclone    | 1994      | Nampula, Zambezia, Manica, Sofala                                                                                                    | 240              |
| 9  | Epidemic      | 1983      | Maputo, Gaza, Inhambane, Manica, Sofala and Zambezia                                                                                 | 189              |
| 10 | T. Cyclone    | 1984      | Maputo, Gaza, Inhambane                                                                                                              | 109              |

Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

**Table 10.2 Top ten natural disasters: number of affected**

| No | Disaster Type | Year      | Location                                                                                                                              | Number of Killed |
|----|---------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1  | Drought       | 1981/1985 | Maputo, Gaza                                                                                                                          | 5 750 000        |
| 2  | Flood         | 2000      | Maputo (Matutuine, Manhiça, Magude and Marracune), Gaza (Mabalane, Chokwé, Chibuto, and Zai-Zai), Inhambane, Sofala, Manhiça and Tete | 4 500 000        |
| 3  | Drought       | 1991/1992 | South and Central Mozambique                                                                                                          | 3 300 000        |
| 4  | Drought       | 1998/1999 | Maputo, Gaza and Inhambane                                                                                                            | 3 300 000        |
| 5  | T. Cyclone    | 1994      | Nampula, Zambezia, Manica and Sofala                                                                                                  | 2 000 000        |
| 6  | Drought       | 1994/1995 | Central and South                                                                                                                     | 1 500 000        |
| 7  | Drought       | 2005/2006 | Maputo, Gaza, Inhambane, Sofala, Manica, Tete and Zambezia                                                                            | 1 400 000        |
| 8  | Drought       | 2002/2003 | South and Central provinces                                                                                                           | 600 000          |
| 9  | Flood         | 2001      | Zambezia, Tete, Sofala, Manica and Gaza                                                                                               | 549 326          |
| 10 | Drought       | 2007      | South and Central provinces                                                                                                           | 520 000          |

Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

the deadliest disaster to have affected the country. It is important to note that in the same period Mozambique was under armed conflict, which meant many people were displaced, there was limited access to the country and the food-production system was deficient. All these constraints may have aggravated the impact of this particular disaster. On the other hand, floods and epidemics are the most frequently occurring deadly disasters in Mozambique.

Table 10.2 shows the top ten natural disasters sorted by the number of people affected, which reveals that droughts are the main disasters in terms of number of people affected. Nevertheless, a single flood event in 2000, which occurred in a short period (a few weeks) affected millions of people – more than the prolonged drought of 1981 to 1985.

A summary of the impacts caused by all the disasters in the database is shown in Table 10.3.

Droughts and floods are the main events that affect the majority of the population in disaster-prone areas in Mozambique. Floods and epidemics are the most common events followed by tropical cyclones. The number of people killed is very high for droughts. As shown in Table 10.1, a single event with a duration of five years (1981–1985) killed about 100 000

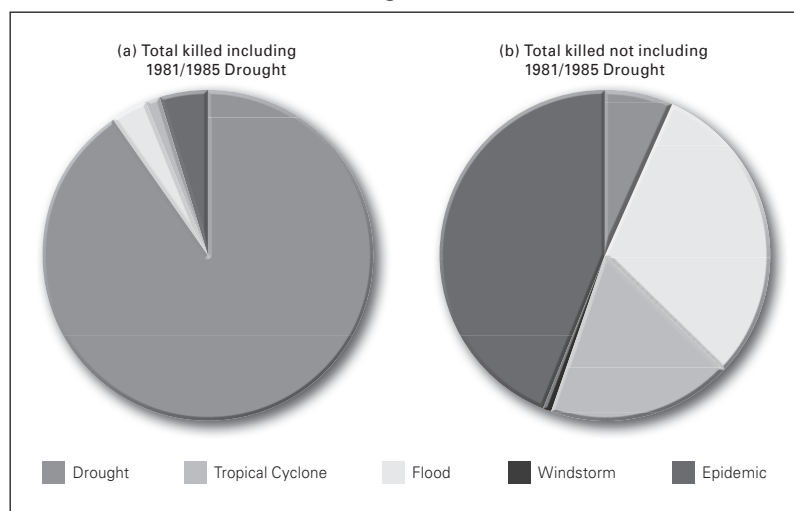


**Table 10.3 Summary of the impacts of natural disasters, 1956–2008**

| No | Disaster type    | Number of Events | Total Killed | Total Affected |
|----|------------------|------------------|--------------|----------------|
| 1  | Drought          | 10               | 100 200      | 16 444 000     |
| 2  | Flood            | 20               | 1 921        | 9 039 251      |
| 3  | Tropical Cyclone | 13               | 697          | 2 997 300      |
| 4  | Epidemic         | 18               | 2 446        | 314 056        |
| 5  | Windstorm        | 5                | 20           | 5 100          |
| 6  | Earthquake       | 1                | 4            | 1 440          |

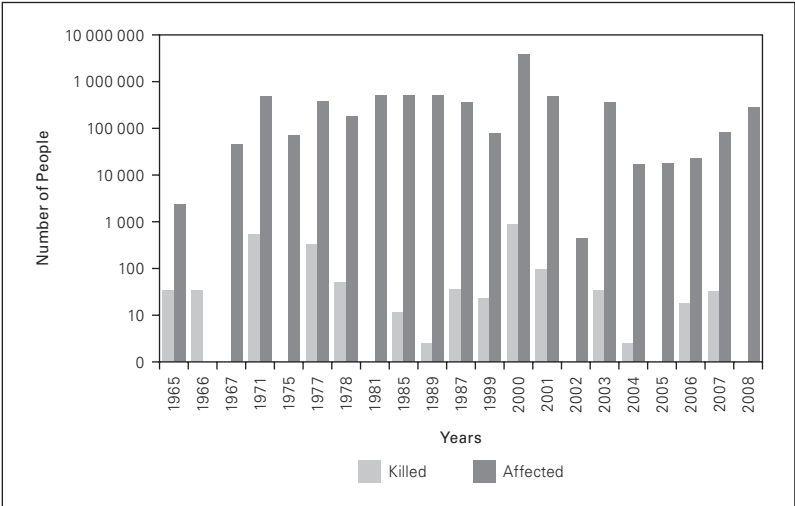
Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

people. If this information is presented graphically it gives impression that droughts are virtually the only cause of death (see Figure 10.4(a)), because the other causes become insignificant in comparison. Looking at the same results without the deaths caused by the 1981–1985 drought, if we consider that this occurred during the civil war and the ability to assist the population or produce food was limited, then the number of deaths was aggravated by war. Under these circumstances it is noted that epidemics and floods are responsible for more deaths (see Figure 10.4(b)).

**Figure 10.4 Number of people killed by natural disasters, 1956–2008, with 1981–1985 drought (a) and without this event (b)**

Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

**Figure 10.5 Numbers affected and killed by floods in the recorded database**



Source Queface, A., 2009. Historical overview of natural disasters. In *INGC climate change report*. Maputo: National Institute for Disaster Management.

Given that floods are the most commonly occurring disaster types affecting the country, it is possible to establish some facts related to the trends on the number of people killed or affected throughout the decades of data collection. Figure 10.5 reveals that before 2000 around half a million people were frequently affected by each flood event. The worst case occurred in 2000 when 4,5 million people were affected and 800 killed. To help visualise the number of people killed and affected in the same scale a log scale was applied to the vertical axis. The year 2000 was a significant turning point and provided an important lesson for disaster management-related institutions. Since 2000 a lot of effort has been made to reduce the number of victims killed and affected, as demonstrated in Figure 10.5.

### Adaptation Strategies for Climate Change in Mozambique

Extreme climatic events, like floods, droughts and cyclones, are very likely a result of global GHG emissions. This means that these phenomena should be viewed not just as local issues. Adaptation measures to extreme climate events should be taken at the international, regional,

national and local levels, as discussed in many international, regional and national plans, policies, strategies, programmes and projects.

### **Strategies at the international level**

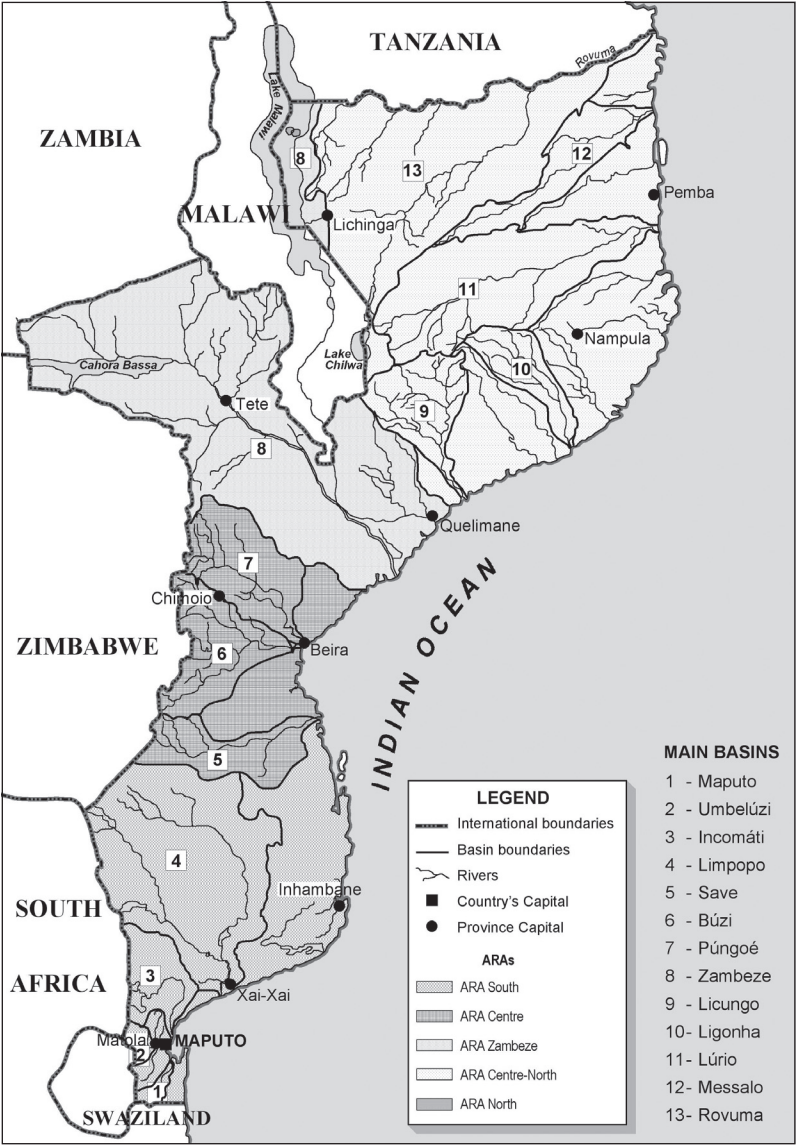
Climate change is a global problem demanding global solutions. The solutions to climate change problems may be achieved by mitigation measures, which are taking part at the international level. Nevertheless, developing countries are already suffering from the impacts of climate change. Therefore, there is a need to find ways to help developing countries build their adaptive capabilities. There are various initiatives supporting adaptation to climate change at the global level, like the recently created Adaptation Fund, the Global Environment Facility initiative, and the call for the creation of a United Nations Environment Organization, among others. Nevertheless, additional measures, like the integration of climate change issues into development aid, should be considered. International focus in adaptation has been oriented at tackling almost exclusively social issues. The importance of technology in adaptation is mostly neglected. Technology transfer is almost always associated with mitigation measures at the international level.

### **Strategies at the regional level**

Floods and droughts in Mozambique both mainly occur in transboundary river basins.<sup>6</sup> There are nine transboundary river basins in the country, as outlined in Map 10.2.

The Maputo River (known as Usulu in both South Africa and Swaziland) is shared by the three countries. The Umbeluzi River originates in Swaziland and is shared by Mozambique and Swaziland. The Incomati River has as its main tributaries the Sabie (South Africa), Crocodile (South Africa) and Komati rivers (South Africa and Swaziland). The Limpopo River basin encompasses four countries: Botswana, South Africa, Zimbabwe and Mozambique. The basins of the Save, Buzi and Pungue rivers are shared by Mozambique and Zimbabwe. The Zambezi is the largest African river that flows into the Indian Ocean, and drains the greater part of the centre-south region of Africa. The Zambezi basin includes Mozambique and seven other countries: Angola, Botswana, Malawi, Namibia, Tanzania, Zambia and Zimbabwe. Mozambique and Tanzania share the basin of the Rovuma. Important adaptation measures to be adopted for river basins are as follows:

Map 10.2 River Basins of Mozambique



- Improving the sharing of information among countries involved in river basin organisations.
- Strengthening river basin organisations.

- Strengthening the involvement of stakeholders in issues related to river basin organisations.
- Strengthening hydro-meteorological networks in river basins.
- Undertaking common research programmes among countries sharing the same river basins, and looking at different aspects of the basins.
- Undertaking common training programmes on issues related to the management of river basins.
- Promoting an ecosystems approach in the management of river basins.

The issue of barriers and adaptation implementation in the framework of the water sector has been discussed at the continental level. The German Agency for International Cooperation has been supporting a capacity-building programme for river basin organisations in Africa,<sup>7</sup> which includes the issue of technology and adaptation implementation. The Southern African Development Community (SADC) water sector is guided by a number of policy instruments and strategies, which include Protocol on Shared Water Courses, SADC Policy and Strategy, and SADC Action Plan and bilateral agreements, among others. In all these instruments the issue of technological needs to enhance adaptation is directly or indirectly specified. However, resources have been a major impediment for promoting technological adaptation at the regional level.

## Strategies at the national level

The surface waters are the country's main water resource. Mean annual run-off is estimated at 216 000 million cubic metres (Mm<sup>3</sup>), of which only 100 000 Mm<sup>3</sup> originates in rainfall inside Mozambique. The remainder originates in countries upstream, which is why this figure has been falling with the increased use of water in those countries. The basin of the Zambezi River represents almost 50 per cent of the surface water resources and about 50 per cent of the flow from countries located upstream. Therefore, in Mozambique the availability per capita of surface water resources is currently about 5 556 cubic metres per inhabitant per year, taking into account only the run-off generated in the country, or 12 000 cubic metres per inhabitant per year, including the flows from neighbouring countries. Both these figures, however, are constantly declining – on the one hand because of population growth,

**Table 10.4 Per capita availability of surface water**

| Region                                                                                                                        | Population (millions) | Mean annual run-off (km <sup>3</sup> ) | Per capita water availability (m <sup>3</sup> /inhabitant/year) |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------|-----------------------------------------------------------------|
| Africa                                                                                                                        | 590                   | 4 200                                  | 7 119                                                           |
| North America                                                                                                                 | 350                   | 6 000                                  | 17 143                                                          |
| South America                                                                                                                 | 260                   | 10 400                                 | 40 000                                                          |
| Asia                                                                                                                          | 3 510                 | 13 200                                 | 3 761                                                           |
| Australia                                                                                                                     | 20                    | 2 000                                  | 100 000                                                         |
| Europe                                                                                                                        | 570                   | 3 100                                  | 5 439                                                           |
| World                                                                                                                         | 5 300                 | 38 900                                 | 7 340                                                           |
| Mozambique                                                                                                                    | 18                    | 100 <sup>a</sup> (216) <sup>b</sup>    | 5 556 <sup>a</sup> (12 000) <sup>b</sup>                        |
| <b>Notes:</b> (a) Including only the run-off generated in the country;<br>(b) Including the flows from neighbouring countries |                       |                                        |                                                                 |

Source: National Directorate of Water, 1999. *Water resources of Mozambique*.

and on the other, because of the reduction in the flows from countries upstream. Table 10.4 represents per capita availability of surface water worldwide.

It can be seen from Table 10.4 that, compared with other parts of the world, Mozambique has a shortage of water. Indeed, in Mozambique per capita water availability (excluding the in-flows from countries upstream) is below the African average. This situation is worsened by the geographical and seasonal distribution of the water in the country, which results periodically in serious droughts in some parts of Mozambique, in addition to regional droughts covering all of Southern Africa.

According to the IPCC, the region of Southern Africa will experience less water availability. The little rain expected will be available in very short periods. These situations will lead to both floods and droughts. The country has to learn to live with both phenomena. On the other hand, the intensity and frequency of cyclones will also be higher. Map 10.3 shows areas of flooding, drought and cyclone risk in Mozambique.

There is a need to adopt a proactive approach to these natural disasters before, during and after their occurrence. Major adaptation measures to be adopted can be summarised as short, medium and long term, as outlined in the next sections.

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## **Short-term strategies**

- Building awareness of the relevance of climate change in development pathways to ensure that climate change is recognised as relevant and an urgent priority across sectors.
- Reinforcement of the early-warning mechanisms, with particular focus on the technology component. Early-warning mechanisms require communicability among institutions themselves and among institutions and populations. The most powerful communication media for this purpose presently in rural areas is radio, but not all people have radio receptors. Getting batteries for radios is sometimes a problem. Cellphones, where a network exists, have been very instrumental in enhancing communicability. Small-scale renewable energy systems, particularly photovoltaics, could enhance communicability by powering radios and cellphones, among other communication types. Many adaptation instruments approved by the government give strong emphasis to the issue of warning mechanisms, but the technology is still lacking.
- Reinforcement of institutions dealing with climate change adaptation and disaster management. Again, one of the major issues is to provide technological capacity to institutions so that they can get in real time the required information from relevant organisations. For instance, institutions at local level should access on a regular basis the weather forecasting from meteorological services, which requires access to radio, television or internet. Such capacity is still missing in most institutions.
- Building technological adaptation through construction of dams for water control and storage, use of ground-water resources, harvesting of rainwater, among others. The characteristics of the run-off regime of Mozambican rivers require the storage of water through dams to permit the intensive use of their water resources.<sup>6</sup> The country is, however, poorly equipped in terms of essential infrastructure, with only a few large dams – a marked discrepancy compared with neighbouring countries South Africa and Zimbabwe. The total water-storage capacity is currently about 56 000 Mm<sup>3</sup>, with a useful capacity of 45 000 Mm<sup>3</sup>, about 90 per cent of which corresponds to the capacity of the Cahora Bassa Dam, on the Zambezi River. The total useful storage capacity represents 21 per cent of the mean annual flow of the country's rivers. However, if Cahora Bassa is excluded, the remaining 5 800 Mm<sup>3</sup> of useful



capacity represents only 5 per cent of the mean annual run-off of the country's rivers, excluding the Zambezi. A study carried out in 1984 on some of the country's main rivers showed that a storage capacity of 10–40 per cent of the mean annual flow would be necessary, for a usage of 50 per cent of the mean annual flow, with a reliability of 90 per cent. Therefore, new large dams are under planning and are currently at various design stages. Their construction will significantly enhance the technological adaptation capacity of the country. It is to be noted that rural populations are highly dispersed and, therefore, point sources, such as boreholes and wells, are the most appropriate water supply systems. Therefore, ground water is one of the most important sources of fresh water during the dry seasons, particularly in arid and semi-arid areas. On the other hand, ground water is often preferable to surface water, as it can be found in large quantities in many geological formations, especially in the sedimentary and weathered rocks, and its quality is generally suitable for human consumption. Therefore it is essential to both improve the understanding of the factors controlling ground water occurrence in many geological formations occurring in Mozambique, and to develop cost-effective technologies for bringing water to the surface. Renewable energy technologies can be a solution for bringing ground water to the surface and also for water sanitation. Nowadays hand pumps are mainly used to lift water from boreholes. Harvesting rainwater is another issue of great importance in enhancing adaptive capacity. Few provinces of the country have experience in developing technologies for rainwater harvesting – either in households or farms. This technology could be made available in other provinces.

### ***Medium-term strategies***

- Mainstreaming climate change into development, enabling climate change issues to be integrated into different aspects of development planning.
- Reinforcement of scientific and technical capacity in climate change issues to inform development policies and plans.
- Reinforcement of the capacity of forecasting climate patterns up to several months into the future in order to enhance the capacity to respond to disaster situations. This requires an improvement in the hydro-meteorological network. Currently, the meteorological and the hydrological networks are not integrated, and the number

of observation stations is still very limited. Better networking with other regional networks is also essential.

- Expansion and integration of hydro and meteorological networks and the introduction of modern technologies for data collection, transmission and processing. Currently, most stations are based on direct readings and manual retrieval of data. Most data remains unprocessed for years. The introduction of modern technologies could help to overcome this situation, enabling fast collection, retrieval, transmission and exchange of data among different stakeholders.
- Computerisation of meteorological and hydrological databases and publication of meteorological and hydrological yearbooks, including systematic and regular exchange of information with neighbouring countries. The current situation is characterised by a manual retrieval of data, as explained above, with little processing of the data. Access to computers and appropriate software programs is essential to enable stakeholders to access data in a form appropriate for immediate processing. Regular publication of relevant information is also critical.

### ***Long-term strategies***

- Translation of scientific information into a format that is applicable to practical action by different stakeholders. Most people cannot read scientific academic publications. If scientists assume it is their role to take their findings to the different stakeholders, including communities, then they have to find appropriate means to achieve the goal. This may include direct interaction with stakeholders, including, for example, video presentations.
- Building institutional receptivity across different sectors and organisations to convey such information.
- Undertaking comprehensive studies of water resources, both surface and ground, covering the different aspects, like physical, ecological, salt intrusion issues, among others.
- Promoting the use of water desalination technologies for both sea water and water from boreholes, which in many cases have a high salt content in arid and semi-arid areas.

### **Strategies at the local level**

For local communities, climate change is a day-to-day reality. Local communities have observed significant changes in their climates. Their

feeling is that rainwater is getting scarcer and more unpredictable. On the other hand, when there are floods the intensity of the rainfall has increased. Therefore, survival is becoming more difficult than in the past. The communities have to adapt to this change in weather patterns. At this level, adaptation is based more on sharing knowledge and experience, as the life of communities is more based on natural resources. Adaptation measures at the local level are described in the following sections.

### ***Short- and medium-term strategies***

- Settlement of populations in appropriate places, taking into account floods, droughts and cyclones.
- Reinforcement of the early-warning mechanisms. Here the most important issue is to equip local institutions and communities with appropriate communication technologies to enable faster dissemination of information. Radios and cellphones are the most important.
- Dissemination of techniques for harvesting rainwater, as explained prior.
- Promotion of cultivating fast-maturing crops and drought-resistant crops. Support from research institutions, like the Institute for Agrarian Research of Mozambique is essential; the Institute has been undertaking these activities. With additional support it could do more.
- Promotion of plantation of native fruit trees due to their capacity to adapt to different water stresses.
- Promotion of climate-proof constructions. The construction legislation could be updated to incorporate the important issue of climate change.

### ***Long-term strategies***

- Promotion of community-based adaptation approaches, by sharing of knowledge and experience among communities inside and outside the country, whereby researchers act as facilitators using new ways of communicating findings, such as by video, mass media and direct interaction with communities. The classic way of undertaking research ends with the publication of papers in specialised journals and conferences. It does not promote the sharing of research findings with communities. Methods of education that are based on community interaction are still not significantly promoted.

## Technological Barriers to Effective Climate Change Adaptation

Adaptation to climate change involves a change in behaviour and a consequent shift in activities as a result of changing environment conditions. This often requires the procurement and adoption of new technologies, leading to technology transfer. Based on considerations discussed in Chapter 9, some of the major technological barriers to climate change adaptation activities are presented in the following sections.

### Low density and quality of hydro and meteorological networks

The registration, storage and processing of hydro and meteorological data are fundamental for devising good adaptation strategies. In Mozambique meteorological data is obtained by several institutions – the National Meteorology Institute (INAM), the Institute for Agricultural Research of Mozambique, the National Directorate of Waters (DNA), the National Water Administrations (ARAs) and others. INAM is responsible for the validation and dissemination of such information. There are a number of rain-gauging stations that possess data going back more than 40 years. The largest set of data refers to Maputo, and includes data from almost 90 years ago. Map 10.4 shows Mozambique's rain-gauge network.

Hydrometric data is measured by the DNA and the ARAs; this is complemented by measurements made by the Cahora Bassa Hydroelectric Company and the electricity company, EDM, of the levels and discharges of the Cahora Bassa and Chicamba dams. The information available from the hydrometric stations is relatively small, since only a small number of stations have data going back 30 or 40 years. Map 10.5 shows the country's hydrometric network.

So far there is no network to measure ground water, either in quantitative or qualitative terms, although this is the water supply source used by some of the country's major cities. And to date, there is no network of stations to control the quality of surface waters. However, specific analyses have been undertaken, particularly in rivers that feed some urban areas. Regarding cyclones, the stations for monitoring their formation, development and movement is very limited. Apart from all these considerations, it should be noted that hydro and meteorological stations work independently. Ideally, they should be integrated and linked with other similar regional networks.

**Map 10.4 Mozambique's rain-gauge network**



Map 10.5 Mozambique’s hydrometric network



## Limitations in communication infrastructure

Early-warning systems are based on hydrometeorological stations as sources of information, but in order for this information to reach the target groups, particularly communities, communication infrastructure is essential (e.g. radio, television, the internet, land phones and cellphones). This is another prerequisite for an effective early-warning mechanism. The 2000/2001 flooding, for instance, had a dramatic negative impact. The 2007/2008 flooding was of a similar magnitude, but the impact was much less than that of the 2000/2001 floods. This was because the level of organisation of the National Institute for Disaster Management, the government and the communities was much higher. At the same time, it should be noted that another factor that contributed was the improvement of the cellphone network. This enabled early-warning mechanisms to work much better. A communication policy framework emphasising the need to strengthen communications in areas vulnerable to climate change is important.

## Limitations in water-control infrastructure

As mentioned earlier, Mozambique has serious limitations in water control infrastructure, but this is gradually being created. A point to be noted here is the fact that the country has recently established a Water Research Institute, whose mandate is to undertake all types of research related to water issues. Also in the pipeline is the establishment of a twin university in Mozambique to the UN University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES). UNU-FLORES specialises in water, soils and waste management. Both institutions will significantly enhance the research capacity for adaptation related to water in Mozambique.<sup>8</sup>

## Weak dissemination of rainwater-harvesting technology

Some provinces of the country, like Inhambane, for instance, have adopted good practices in terms of rainwater harvesting for domestic use. Some houses are equipped with rain-collecting units linked to storage tanks, for example. In other provinces there are some small-scale reservoirs for collecting water for farming. This helps in drought periods. From these examples there is room to learn from best practices and extend the experience to other communities.

## Low penetration of modern energy services

Access to electricity is currently limited to just 14 per cent of Mozambique's population. Biomass consumption accounts for about 80 per cent of the energy consumed in the country and around 60 per cent of the energy used in peri-urban areas comes from biomass. Nevertheless, the country has substantial energy resources, both conventional and renewable, like hydro, natural gas, coal, solar, wind, ocean, geothermal and biomass. In terms of the energy development index, Mozambique occupies the second-lowest position in the world.<sup>9</sup> Access to modern energy services, defined as electricity and clean cooking fuels, is central to a country's development. Poor access contributes to the slow pace of national development and poverty reduction, delaying the achievement of the Millennium Development Goals (MDGs). Renewable-energy systems can contribute to improving access to modern energy services by local communities. Up to now the major impediment for this access was the high capital cost of renewable-energy systems. However, the emerging technology of photovoltaic systems, whose costs are very low, can help improve such access.

## Conclusions and Policy Considerations

Compared with other parts of the world, Mozambique has a shortage of water. Indeed, in Mozambique per capita water availability is below the African average. According to the IPCC, the region will be affected by decreasing water availability due to the impacts of climate change. This will lead to droughts as the major pattern, but floods will also occur and with greater intensity. Both droughts and floods will affect particularly the transboundary river basins because of inefficient water management schemes in the region. Water scarcity in Mozambique will lead to saline water intrusion in both surface and ground water, among other impacts. Furthermore, the geographic position of the country along its coastline makes it vulnerable to cyclones formed in the Indian Ocean.

Adaptation to all these phenomena will require undertaking appropriate measures at international, regional, national and local levels. Although the country has developed strategies for facing climate change impacts, there are several technological barriers that still hinder the achievement of the objectives contained in the strategies. Such barriers include the low density and quality of hydro and meteorological networks, including the lack of integration of such networks; limitations in



communication infrastructure, which is a support for the early-warning mechanisms; limitations in water-control infrastructure, which could reduce the impacts of both floods and droughts; the weak dissemination of rainwater-harvesting technologies, which could help local communities cope with droughts; and, finally, the low penetration of modern energy services, which form the foundation for local sustainable development in all aspects. These barriers have to be overcome incrementally in order to promote climate-proof development. This requires investment, particularly for capacity building. In order for this to be a reality the different policy instruments related to climate change adaptation should reflect the need for consideration of technological issues. So far, this is not the case.

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# The legal barriers to climate change adaptation

*Marie Parramon*

## Introduction

The legal challenges related to climate change adaptation have only recently been acknowledged and addressed at the international and national levels.

In recent years, the international community has ramped up specific projects and programs aimed at supporting the capacity to adapt to the impacts of climate change and the transition to a low-carbon economy in developing countries. Some include a legal analysis component. However to date, a systematic and comprehensive examination of the enabling legal environment conducive to effective climate change adaptation and mitigation at a country level has not taken place. While donor countries contribute to a plethora of disparate climate initiatives, both donor and recipient countries confirm that insufficient attention is being given to the legal and governance foundations that link them and support them.<sup>1</sup>

The implementation of effective adaptation measures to climate change is directly dependent on the provisions of the applicable relevant international and national legal frameworks. The legal framework can either be an enabler of effective adaptation to climate change or it can impede it. This chapter strives to provide a high-level overview and preliminary analysis of some of the key legal barriers that have been recognised as impeding effective climate change adaptation. This

chapter does not provide an exhaustive and in-depth analysis of all the legal barriers to climate change adaptation. Instead, it should be regarded as an introduction to the topic. The chapter focuses primarily on the legal barriers that affect adaptation to climate change at the national level. This approach is justified by the fact that most of the key adaptation actions will take place at the national level, and more specifically at the local level.

The chapter commences by providing an overview of the international legal framework in terms of climate change adaptation. It then provides an appraisal of some of the key legal barriers related to the international legal framework. The analysis focuses on the national legal framework commonly related to climate change adaptation, from a generic perspective, striving to identify and analyse some of the key related legal barriers. The chapter finally sets out preliminary recommendations to address the legal barriers, promoting the legal framework (internationally and nationally) as an enabler to climate change adaptation. The overall aim is to raise awareness of the critical importance of the legal considerations in terms of adaptation, aiming to demonstrate that if they are not addressed in a proactive and effective manner, this could impair effective adaptation to climate change in Africa, ultimately jeopardising sustainable development of most African countries.

## **Legal Barriers Related to the International Legal Regime Pertaining to Climate Change Adaptation**

### **Defining adaptation**

In terms of the UN Framework Convention on Climate Change (UNFCCC) 1994 glossary, adaptation is defined as ‘the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities’. This legal definition might in itself present some challenges, especially regarding its interpretation by various stakeholders, in a restrictive or broad manner. For example, economic adaptation is not commonly regarded as being within the scope of climate change adaptation. Meanwhile, adaptation measures need to be developed and implemented to address the economic vulnerability of developing countries’ economies to the direct and indirect effects of climate change (i.e. impacts on crop production, impacts on economic markets, change in trade policies and agreement, and change in consumption

patterns). However, it is currently unclear if the costs of such economic adaptation-related measures would be featured in the required financial support from developed countries to developing countries to meet the costs of adaptation to the adverse effects of climate change.

There are various types of adaptation,<sup>2</sup> including:

- planned adaptation, originated by a deliberate policy decision aimed at returning to, maintaining or achieving a desired state,
- anticipatory adaptation, undertaken before impacts of climate change are observed and
- autonomous adaptation, triggered by ecological changes in natural systems and by market or welfare changes in human systems.

Planned adaptation is particularly relevant for present purposes due to the deliberateness of decisions required to achieve planned adaptation. This type of adaptation can respond to specific projected impacts of climate change. Autonomous adaptation does not constitute a deliberate response to climatic stimuli, but is triggered by ecological changes in natural systems and by market or welfare changes in human systems. This type of adaptation often occurs at the community and local levels. Actions and policies by governments can be characterised as planned or anticipatory adaptation, but they can also influence the autonomous adaptation action undertaken directly. All the aforementioned categories of adaptation will encompass legal considerations and challenges.

## Implementation and enforcement challenges

From an international perspective, the UNFCCC 1994 document and the associated Kyoto Protocol of 1996 only set out broad, generic obligations and policy directions in terms of adaptation to climate change.

Article 4.1 of the UNFCCC commits countries to prepare for and facilitate adequate adaptation to climate change by way of ‘formulating, implementing, publishing and regularly updating national measures to facilitate adequate adaptation to climate change’.<sup>3</sup> The importance of national responsibility for climate change adaptation is acknowledged, but the guidance provided by the UNFCCC on the process and methodology to develop such national measures is fairly limited. To complement this general obligation, the Convention recognises the need for international support to facilitate the development and implementation of these national adaptation measures, requiring

parties (mainly developed countries) to take the necessary actions related to funding, insurance and the transfer of technology, to meet the specific needs and concerns of developing countries arising from the adverse effects of climate change, especially for those countries that are highly vulnerable to climate change. This includes 'countries with fragile and mountainous eco-systems' as well as 'land-locked and transit countries'.<sup>4</sup> In addition, the Convention adds that the parties need to take full account of the specific needs and special situations of the least developed countries in their actions with regard to funding and transfer of technology.<sup>5</sup> Ultimately, the Convention requires developed countries to assist developing countries in meeting the costs of adaptation to the adverse effects of climate change.<sup>6</sup> This approach creates a direct dependency of developing countries on developed countries' assistance, in terms of their ability (especially financial) to adapt effectively and timeously to climate change. Such financial dependency can be regarded as a limitation in itself, as the flow of climate change finance is currently not optimally implemented.

Initially, it was difficult to effectively implement the generic provisions of the Convention. Developing countries lacked the necessary skills and capacity to develop adaptation measures, and the support from developed countries was limited. In response to such implementation challenges, various supporting initiatives to the UNFCCC have been developed at the international level to facilitate the implementation of the provisions of the Convention and assist national actions in terms of climate change adaptation. These include:

- Specific work on enhanced action on adaptation as part of the Bali Action Plan under the Ad Hoc Working Group on Long-Term Cooperative Action under the UNFCCC (AWG-LCA).
- The Nairobi work programme on impacts, vulnerability and adaptation to climate change, development and transfer of technologies, research and systematic observation under the Subsidiary Body for Scientific and Technological Advice.
- Work to support the development of national adaptation programmes of action (NAPAs). In order to address the urgent adaptation needs of least developed countries, a new approach was needed that would focus on enhancing adaptive capacity to climate variability, which itself would help address the adverse effects of climate change. The NAPA takes into account existing coping strategies at grass-roots level, and builds upon that to identify

priority activities, rather than focusing on scenario-based modelling to assess future vulnerability and long-term policy at state level. In the NAPA process, prominence is given to community-level input as an important source of information, recognising that grass-roots communities are the main stakeholders.

- Work conducted under the Subsidiary Body for Implementation to ensure that adaptation is supported through finance, technology and capacity building.
- The Cancún Adaptation Framework (CAF): The parties adopted the CAF as part of the Cancún agreements at the 2010 Climate Change Conference in Cancún, Mexico (or COP16). In these agreements, the parties affirmed that adaptation must be addressed with the same level of priority as mitigation. The CAF is the result of three years of negotiations on adaptation under the AWG-LCA, which had followed the adoption of the Bali Action Plan at the 2007 Climate Change Conference in Bali, Indonesia (COP13). The Bali Action Plan sought to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, up to and beyond 2012.

These supportive initiatives have mainly resulted in the development of adaptation projects, plans, programmes, strategies and policies at regional, national and local levels. The interventions are still of a strategic nature. Like any strategy or policy document, they have an intrinsic weakness linked to their legal status – they are not legally binding. Therefore, a policy or strategy document could be left unimplemented or ineffectively implemented for many years without any legal consequences.

It has now become clear that climate change adaptation, as has been done for climate change mitigation, needs to be integrated and mainstreamed into existing legal frameworks. For example, in East Africa some progress has been made on integrating adaptation into the most vulnerable sectors. In their national communications to the UNFCCC, Tanzania, Uganda and Sudan identified a number of adaptation measures, including:

- increasing irrigation to boost crop production,
- introducing low-water-use crops and adopting sustainable water-resource management policies (e.g. seasonal rainfall harvesting; water quality control),

- increasing capital investment in reservoirs and infrastructure,
- reducing water loss through water-conservation technologies,
- making water-resource management an attractive career and field of investment,
- instituting policy mechanisms to control unsustainable forest clearing and forest consumption,
- promoting techniques for tackling emergency food shortage and
- adjusting farming areas and reducing animal population.

The challenge, however, remains the implementation of such adaptation measures, most of which require legal interventions using the existing national legal frameworks. The CAF reiterates the commitment of developed countries to provide adequate, predictable and sustainable financial resources, technology and capacity building in order to support the implementation of adaptation action in developing countries. Nevertheless, questions remain in determining how to practically implement such an obligation.

Much of the adaptation measures supported by the international legal regime have been on an ad hoc basis. The review of the NAPAs of various African countries confirms that a project/programme approach has mainly been adopted in terms of adaptation. The defining characteristic of all projects and programmes on adaptation is that each one is multidimensional, but also case-specific. A more systematic and integrated approach has been called for, especially at national level, requiring legal mainstreaming of climate change adaptation considerations within the national legal regime.

At the international level, climate change adaptation needs to be mainstreamed in other international treaties, both environmental treaties and those related to sustainable development. The fact that climate change adaptation has mainly been dealt with separately as a sectoral issue, has affected its effective mainstreaming in other international treaties (i.e. the Convention on Biological Diversity [1992], the conventions under the International Maritime Organisation, the treaties related to the international Millennium Development Goals and trade-related agreements). Legal challenges in this context can be reflected by the question of the inclusion of climate change as a source of marine pollution and, more specifically, of land-based marine pollution (LBMP).<sup>7</sup> Such a question was debated at the Conference of the Parties of the Nairobi and Abidjan Conventions<sup>8</sup> in November 2007. One of the propositions was to make reference to climate change in the Third Draft



Protocol addition to the Nairobi Convention concerning land-based sources and activities of marine pollution. This proposition was founded on the fact that climate change is a direct result of land-based activities creating greenhouse gas emissions in the atmosphere, and has negative impacts on the marine environment.<sup>9</sup> Some have opposed this approach,<sup>10</sup> arguing that climate change could not be included in the definition of LBMP, as it could not be legally defined as ‘pollution’ or as ‘contributing to marine pollution’. However, the interrelationship between climate change and the marine environment is now internationally recognised.<sup>11</sup> Moreover, various experts recognise the potential impacts of climate change or the contribution of climate change to LBMP impacts.<sup>12</sup> It is, therefore, suggested that climate change could be characterised as a diffuse<sup>13</sup> source of LBMP or as a factor contributing to LBMP.

As with any environmental international legal instrument, the enforcement of the UNFCCC and the Kyoto Protocol is an intrinsic challenge, referred to by Macrory as the ‘Achilles heel’ of many environmental treaties.<sup>14</sup> The question of states’ liability and the application of the polluter pays principle for damages due to human-induced climate change are regarded as challenging legal matters.<sup>15</sup>

### **Legal challenges related to the international negotiation process**

The positions expressed by African countries at international level during the negotiation sessions are founded on increasingly informed technical, scientific, economic and social information, research and studies. However, the situation is different in regard to legal research and studies relating to the phenomenon of climate change in the African context:

While some African delegations enjoy the support of climate change-literate legal expertise during and between periods of negotiation, this is the exception rather than the rule and is in stark contrast to the level of legal support retained by certain developed country Parties.<sup>16</sup>

This is regarded as a legal challenge that can impair the negotiation process related to climate change adaptation. Some complex legal matters (i.e. the compliance mechanism under the Kyoto Protocol, the legal form of the post-2012 agreement, the legal structure of a climate change

fund or the structure of intellectual property rights in relation to climate change) are discussed during the negotiations, and expert legal assistance is required to be able to participate effectively in such discussions. Moreover, specific legal expertise is and will be required to incorporate adaptation perspectives into national policy and legal frameworks, and such legal considerations should be comprehensively assessed and understood during the negotiation process. For example, operation of law is likely to be required to implement adaptation measures and achieve their integration into national policy and regulatory frameworks.

### **Effectiveness of the international legal regime depends on a sound and enabling national legal regime**

Potential donor and recipient countries have confirmed that:

An enabling legal environment, underpinned by good governance, is a prerequisite for the vital contribution of developing countries to adopting a sustainable development pathway. Without the rule of law and good governance, developing countries will not realise the benefits of the international climate regime such as funding for adaptation or the development of a low-carbon economy by full participation in the carbon market. While donor countries contribute to a plethora of disparate climate initiatives, they note that insufficient attention is being given to the legal and governance foundations that link and support existing initiatives. More attention must be given to providing such support so that the promised climate change assistance can be absorbed.<sup>17</sup>

It has also been recognised that:

The effectiveness of the international response to climate change, as well as national climate change adaptation and mitigation strategies, ultimately depends upon the legal tools available in developing countries to ensure their implementation. An enabling legal environment, underpinned by good governance and respect for the rule of law, is a prerequisite for climate change adaptation and mitigation, and for realising the benefits of the international climate regime in support of adaptation and mitigation. The rule of law is also instrumental to ensure an equitable distribution of benefits and the realisation of economic, social and cultural rights.<sup>18</sup>

This issue is currently regarded as one of the key legal barriers that relates concurrently to the national and international legal regimes. Very little guidance has been provided to date to assist the legal mainstreaming of climate change adaptation within existing legal frameworks, at either the international or national level. There is now an urgent need to expedite such a legal mainstreaming process to enable effective climate change adaptation.

Some of the legal barriers related to the international legal regime are currently being addressed. However, it is essential to understand that some of the abovementioned legal barriers are intrinsic to international law and, therefore, it is going to be difficult to overcome them. Ultimately, domestic actions will ensure the effectiveness of the international legal regime and of adaptation measures/actions. It is internationally recognised that national and local actions are critical for effective adaptation. It is important to note that the Cancún agreement reiterates the importance of prioritising and planning country-driven national and sub-national adaptation projects, programmes and strategies, as well as strengthening institutional capacity for coherent plans of action.

In this context, it seems essential to ensure the participation of developing countries in the mechanisms created by the international regime while supporting the development of a domestic legal environment that promotes adaptation. This is the core objective in order to address the key legal barriers related to climate change adaptation. Furthermore, there is a strong argument for the incorporation and integration of climate change adaptation considerations into existing national legal and institutional frameworks, rather than the creation of new and separate regulatory or policy tools.

## **Legal Barriers Related to the National Legal Framework**

### **Lack of legal preparedness for adaptation**

Many countries are now taking concrete actions to facilitate the national legal integration of climate change adaptation. However, there is room for improvement. As explained above, current adaptation strategies and projects are developed and implemented as stand-alone initiatives, which, it is argued, is not the most efficient and comprehensive way to address adaptation. Most of the actions are strategic in nature and their legal status is limited, impairing a systematic and cohesive legal

response to climate change adaptation at domestic level. It is, therefore, important to understand the key role of the domestic legal framework to enable effective climate change adaptation. In this context, it has also been noted that:

The capacity of a country's legal and governance environment to respond to climate change challenges is often given little or no attention. Yet, as governments begin to initiate adaptation strategies, they commonly confront institutional barriers because an enabling legal and governance environment is a prerequisite for adaptation efforts to be deployed effectively. The Cancún agreement recognizes the principles of legal preparedness for adaptation and advocates for national-level institutional arrangements, with a view to enhancing work on the full range of adaptation actions from planning to implementation.<sup>19</sup>

### Legal fragmentation

The legal fragmentation induced by the cross-cutting nature of climate change has also been recognised as a legal barrier. As indicated in a report drafted for the secretariat of the UNFCCC titled *Adaptation assessment, planning and practice: An overview from the Nairobi work programme on impacts, vulnerability and adaptation to climate change*, climate change conditions can undermine sustainable development efforts, affecting major economic sectors, like water, environment, agriculture, forestry and energy. Therefore, one single act dealing with climate change or climate change adaptation will not be able to address all the elements related to climate change adaptation. It is submitted that sectoral legislation needs to mainstream climate change considerations. Adaptation requires coordination both horizontally across the mandates of many government ministries and organs of state, as well as vertically from the national level down to the municipal level. It is submitted that a more effective approach to adaptation would be to integrate/mainstream adaptation considerations in all decisionmaking processes and the relevant domestic legal framework.

### Regulatory uncertainty

The lack of certainty about the potential impacts of climate change needs to be taken into consideration as a legal barrier. Donald Elliott

provides the following statement on the challenge of climate change and regulatory uncertainty:

Many of us working in the environmental field are used to thinking in these terms with regard to uncertainties in technical and scientific information. We are rarely as certain as we would like to be about the effects of substances on human health and the environment. However, where the costs of delay are large, we often wisely choose to act to prevent possible harm to health before all the information is in. What we are not so used to seeing, however, is that a parallel calculus must be undertaken regarding 'regulatory uncertainties'. By regulating too soon we may not only regulate the wrong thing, but we may regulate in the wrong way. To be more precise, it may be that if we had waited a little while, we would have developed regulatory tools and techniques that are better by an amount that more than compensates for the harm that comes about in the meantime.<sup>20</sup>

The legal regime cannot be too rigid and restricted; it needs to be flexible and adaptive to accommodate such uncertainty, which is very difficult to achieve in terms of legal instruments.<sup>21</sup>

### **Examples of specific legal issues**

The issue of property law has been identified as a key legal barrier in some African countries, impairing the adaptation efforts of government and communities. The application of the polluter pays principle and determination of legal liabilities in relation to climate change are also regarded as challenging issues. It is always legally difficult to ascertain that specific damage is due to the effect of climate change. It is also difficult to demonstrate the direct responsibility of an emitter of greenhouse gases for specific damage. The calculation of damages related to climate change is considerably challenging. Another example is the challenge related to the legal institutionalisation of a national financial mechanism for climate change. Taking South Africa as an example, the National Climate Change Response Green Paper (2010) indicates that the government will consider establishing a national climate change fund that will mobilise resources from national and international sources for investment in both climate change mitigation and adaptation actions. The actual legal institutionalisation of such a national fund

may be challenging for some developing countries. It is important to understand that if such a fund is not strongly and comprehensively legally institutionalised, donors might be reticent to contribute to it.

## **Preliminary Recommendations**

### **Legal mainstreaming**

In developed countries progress on the legal mainstreaming of climate change adaptation has been limited. Many countries have carried out climate change projections and impact assessment, but few have started consultation processes to look at adaptation options and identify legislative responses:

Mainstreaming is becoming increasingly prominent in climate policy and international climate change negotiations, as it has in discourses on disaster risk reduction, gender and sustainable development. Given the linkages between climate change and development, many believe that adaptive policies can only be effective if they are integrated into the wider development agenda. The assimilation of adaptation activities within development budgets ensures that these interventions continue to be properly funded over the long term, integrated into relevant sector priorities and balanced against other competing priorities.<sup>22</sup>

In this context, it is argued that the incorporation of climate change adaptation considerations into national legal and institutional frameworks (i.e. legal mainstreaming) would assist in the transition to a more efficient, systematic and integrated approach of adaptation to climate change, and overall to sustainable development. Of particular importance is the integration of adaptation considerations into existing national legal instruments for land use, planning and disaster management. In order to achieve effective implementation of adaptation, it is important to integrate such considerations into the national sustainable development priorities and sectoral development plans at national and local levels:

Now, however, players at all levels are increasingly engaging with the question of how to tackle the impacts of climate change on development in poorer nations. There are growing efforts to reduce

negative impacts and seize opportunities by integrating climate change adaptation into development planning, programmes and budgeting, a process known as mainstreaming. Such a co-ordinated, integrated approach to adaptation is imperative in order to deal with the scale and urgency of dealing with climate change impacts.<sup>23</sup>

Adaptation needs to be mainstreamed into states' developmental and economic policies. To facilitate legal mainstreaming of climate change adaptation in national law, various examples and preliminary guidance are provided below.

### **Practical examples of legal mainstreaming**

In the South African context, an important planning and land-use statutory document at the municipal level is the Integrated Development Plan (IDP), as prescribed by the Local Government Municipal Systems Act (No. 32 of 2000). An IDP is a framework plan for a municipal area that gives an overall direction for development. It aims to coordinate the work of local and other spheres of government in a coherent plan to improve the quality of life for all the people living in an area. It should take into account the existing conditions, problems and resources available for development. The plan should look at economic and social development for the area as a whole. It must set a framework for how land should be used, what infrastructure and services are required and how the environment should be protected. It is, therefore, suggested that an IDP should consider, integrate and reflect climate change adaptation considerations. Such integration will ensure that climate change adaptation is taken into consideration at the highest planning level in the municipal context, informing all planning decisions linked to the IDP in question. Such integration has started in some municipalities in South Africa.

The second example, from a South African perspective, relates to the land-use and planning regulatory tools prescribed by the National Environmental Management: Integrated Coastal Management Act (No. 24 of 2008) (NEM:ICMA), including the determination of the coastal zone, coastal set-back lines, and coastal planning schemes. NEM:ICMA makes few references to the need for the coastal zone, especially the coastal protection zone to take into consideration the potential for the number and severity of natural disasters to increase due to the effects

of global climate change and other impacts on the environment. It emphasises the importance of taking preventive measures to address these threats and the need to protect people, property and economic activities from risks arising from dynamic coastal processes, including the risk of sea-level rise. In this context, it is submitted that climate change adaptation considerations should inform and be fully integrated into the development and implementation of the abovementioned legal tools for coastal land use and planning. It is argued that such a mainstreaming process would facilitate climate change adaptation, especially in vulnerable areas like coastal zones.

The third example relates to environmental impact assessments (EIAs). In South Africa EIAs are regulated by the National Environmental Management Act (No. 107 of 1998) (NEMA) and its associated regulations. In this context, the Ministry of Water and Environmental Affairs recently published the Environmental Impact Assessment Regulations, 2010, Government Notice number (GN) 543 in Government Gazette 33306, dated 18 June 2010, as amended. Previous proposed amendments to the NEMA EIA regulations aimed to address climate change in the EIA process by providing that when considering an application for environmental authorisation, 'the competent authority must take into account any implications of climate change to the implementation of the activity'.<sup>24</sup> Unfortunately, such a provision was then deleted in the current regulations.

The NEMA EIA regulations do not specifically provide that assessment processes should address climate change issues. However, considering the integrated environmental management objectives of NEMA, read with the sustainable development focus of NEMA's Environmental Management Principles,<sup>25</sup> it is submitted that there is a strong argument for the contention that, where relevant, climate change considerations should be addressed during the EIA process. While the introduction of climate change considerations into the EIA regime would have been a welcome innovation, it is submitted that the proposed amendment's fleeting reference did not amount to a comprehensive integration of climate change considerations into the South African EIA process. There are two reasons for this contention. Firstly, the proposed amendment provided no tools to support the competent authority's consideration of climate change. Secondly, there was no concomitant proposed amendment to the contents of reports providing, for example, for the inclusion therein of climate change considerations.



There are four broad recommendations that might assist in smoothing the introduction of climate change considerations into environmental decision-making processes and management related to EIAs:

- Climate change could be addressed and be included, where relevant, in assessment reports.
- The minister or Member of the Executive Council (MEC) could identify activities, which due to their climate change-related impacts or due to their vulnerability to the effects of climate change, should not commence without an environmental authorisation. Similarly, the minister or MEC might identify geographical areas vulnerable to climate change, in which activities might not be undertaken without prior environmental authorisation.
- Climate change could be integrated into other statutory instruments for integrated environmental management.
- EIA-related national and/or provincial guidelines could be developed to facilitate the integration of climate change adaptation and mitigation into the EIA process.

The inclusion of climate change considerations into EIAs would also influence the compilation of the assessment report. Environmental assessments could consider the adaptive capacity of an ecosystem, potentially impacted by a proposed activity, as a factor in the undertaking of the activity and as a context to inform mitigation measures. This term describes 'the ability of a system to adjust to climate change including climate variability and extremes to moderate potential damages, to take advantage of opportunities, or to cope with the consequences'.<sup>26</sup>

Although it is acknowledged that the NEMA EIA very broad assessment requirements are likely, at least notionally, to encompass climate change, it is submitted that the phenomenon is not consistently considered in South African EIAs. Given the importance of the issue to the future of environmental governance, it is submitted that a minor amendment to the new EIA regulations could effectively incorporate climate change into EIAs. It is argued that to ensure sustainable development and sustainable land use, EIAs should assess climate change consideration from a mitigation and adaptation perspective.

The fourth example refers to statutory sectoral planning documents, mainly related to transport, infrastructure development, water management, coastal management, agriculture and poverty alleviation. It is submitted that such existing plans should be amended and reviewed to

incorporate considerations and potential implications related to climate change adaptation.

## Conclusion and Policy Considerations

The following considerations could assist in addressing some of the legal barriers impeding the development and implementation of adaptation actions and measures:

- Climate change adaptation needs to be mainstreamed and effectively integrated into international and national legal and institutional frameworks.
- Further assistance is required from the institutions under the UNFCCC to assist countries in mainstreaming adaptation into their national legal frameworks.
- A more cost-effective and systematic way to address adaptation could be to integrate climate change considerations and implications into existing legal tools for land use, planning and disaster.
- Most of the time it is more effective and easier to adjust existing regulatory tools rather than create new ones to address adaptation, especially in the context of climate change.
- It is important to catalyse African legal thought on climate change and its implications for the development and adaptation of law and legal frameworks on the continent.
- Unpack the legal ramifications for Africa of climate change adaptation and promote an integrated approach to climate change law at national level.
- Facilitate collaboration between legal disciplines with a view to developing climate change adaptation law.
- Promote further legal academic research and teaching related to climate change adaptation.

Finally, the following quote summarises the current challenge in addressing the legal barriers to climate change adaptation:

Law can facilitate adaptation, using regulation to reduce exposure or sensitivity to climate hazards, establishing the legal architecture for new market mechanisms, and funding arrangements for adaptation costs and liability for climate impacts. It can also ensure the accountability of adaptation decision making and addressing

some of the social justice dimensions of adaptation. [ ... ] There are several characteristics of climate change and associated impacts that will make law-making for adaptation uniquely challenging. These include high levels of cascading uncertainty, irreversibility, the context-specificity of impacts, the long delay between emissions and impacts, and the interaction between climate change impacts and other environmental, social, and economic stressors. Laws dealing with substantive climate impacts may be appropriate and necessary in some cases, but the broader challenge for law-makers is to make legal processes and instruments more adaptive and responsive to change itself.<sup>27</sup>

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- 3 United Nations Framework Convention on Climate Change (UNFCCC), 1994. *Article 4: Commitments*. Available at: [http://unfccc.int/essential\\_background/convention/background/items/1362.php](http://unfccc.int/essential_background/convention/background/items/1362.php) [Accessed 17 August 2011].
- 4 Ibid.
- 5 Ibid.
- 6 Ibid.
- 7 Parramon, M., 2011. *The regulation of land-based marine pollution in South Africa and France*. Unpublished LLD, North-West University, South Africa, p.55.
- 8 Fifth Conference of the Parties of the Abidjan Convention and Seventh Conference of the Parties of the Nairobi Convention, 2007. Johannesburg, South Africa.
- 9 Based on a discussion with South African representatives of the Council for Scientific and Industrial Research (CSIR).
- 10 Ibid.
- 11 The IPCC recognises this interrelationship. The International Union for Conservation of Nature has published *The ocean and climate change: Tools and guidelines for action*, which provides an authoritative review of the role of the ocean within the climate debate, as well as a holistic view in terms of mitigation and adaptation strategies, while outlining a clear set of action recommendations for policy decision makers. The publication is available at: [http://cmsdata.iucn.org/downloads/the\\_ocean\\_and\\_climate\\_change.pdf](http://cmsdata.iucn.org/downloads/the_ocean_and_climate_change.pdf) [Accessed 23 August 2011]. See also the WWF, available at: <http://>

- www.panda.org/what\_we\_do/how\_we\_work/conservation/marine/our\_solutions/climate\_change [Accessed 24 August 2011]. 'There is already an accumulating body of evidence to suggest that many marine ecosystems are responding both physically and biologically to changes in regional climate. This is caused predominately by the warming of air, the increase in sea surface temperature (SST) and to a lesser extent by the modification of currents, precipitation regimes and wind patterns' from SAHFOS, 2008. Available at: <http://www.sahfos.ac.uk/climatepercent20encyclopaedia/index2.html> [Accessed 24 August 2011].
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- 13 Ibid.
- 14 Macrory, R., 2008 *Regulation, enforcement and governance in environmental law*. London: Cameron May Publishing.
- 15 Christina, V., 2008. State responsibility for climate change damages. University of Oslo, Faculty of Law, *Nordic Journal of International Law*, 77(1–2), pp.1–22.
- 16 Generally speaking, African legal practice and academia have not, to date, sought comprehensively to address the myriad of legal implications related to current and future climate change impacts facing the continent. Certain countries outside of Africa have developed and are implementing sophisticated legal responses to address climate change. The European Union Emissions Trading Scheme perhaps provides the most striking example of how law and regulation have been directed to achieving a climate-change-related objective, namely to mitigate greenhouse gas emissions from thousands of installations across Europe, through the mechanism of emissions trading. The US provides another example of a jurisdiction that is currently seeking to legislate for climate change. The Law Society of South Africa may be interested to learn that members of Warburton's professional staff are assisting the Environmental Law Faculty of North-West University in devising the very first climate change law curriculum in South Africa, intended to be instituted as a study module in the faculty's Master's in International Environmental Law.
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- 18 Ibid.
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# Conclusion

*Lesley Masters*

## Introduction

In the growing analysis focused on addressing the gap in climate change adaptation, aspects such as the ‘lack of resources, poor institutions, bad governance and inadequate infrastructure’<sup>1</sup> are often cited as challenges. The shortfalls associated with implementing adaptation measures are, however, the result of more complex and multidimensional elements than this typically portrays. Indeed, there may be sufficient resources or even adequate institutions, yet if there is no leadership and sufficient education, or if measures to address adaptation fall outside cultural understanding, then adaptation implementation will not meet with success.

Adaptation remains central to developing country positions in the context of the international climate change negotiations, although it is often a peripheral consideration, or a ‘nice to have’, when it comes to national decision making rather than an essential component of national planning and policy implementation. As the *Stern Review* points out, it is adaptation that ‘will be crucial in reducing vulnerability to climate change and is the only way to cope with the impacts that are inevitable over the next few decades... But it is not an easy option, and it can only reduce, not remove, the impacts.’<sup>2</sup>

The link between sustainable development and adaptation is critical for Africa as a continent where there are a significant number of least

developed countries (LDC) that remain dependent on rain-fed agriculture and commodities.<sup>3</sup> The problem is that failure to address questions of adaptation will have an impact on reducing vulnerability, and as one report points out, will ‘threaten to reverse the gains of sustainable development and undermine the achievement of MDGs [Millennium Development Goals]’.<sup>4</sup> Therefore, an understanding of adaptation needs to go beyond purely environmentalism within Africa, and highlight the real socio-economic and development impact of climate change on issues such food, health, water, poverty and migration.

The framing of the concept of adaptation has also had an impact on how it is addressed in the international climate change negotiations. As the Introduction to this book indicates, adaptation is perceived as a *local* issue, where initiatives to address the impacts of climate change need to be implemented by communities. The idea that this is a local problem that should be responded to at the local level has resulted in growing tensions between developed and developing countries in the climate change negotiations. This is on the basis that despite contributing very little to greenhouse gas (GHG) emissions, many of these countries will face some of the greatest impacts from climate change. Developing countries have, therefore, been vociferous in pressing for finance and technology transfer to enable them to ‘leapfrog’ the traditional carbon-intensive means of development. Framing adaptation as a local issue, however, masks the need for an integrated approach towards adaptation at local, national, regional and international levels. Certainly, any failure to address these ‘local’ issues will have international ramifications in an increasingly globalised world.

When it comes to Africa, the approach towards adaptation has been particularly reactive. The result is that responses are often late and, consequently, not necessarily as effective as if they had been planned for. In an assessment of adaptation practices it was noted that a “wait and see” or reactive approach is often inefficient and could be particularly unsuccessful in addressing irreversible damages, such as species extinction or unrecoverable ecosystem damages, that may result from climate change’.<sup>5</sup> Management and planning are, therefore, crucial components in assessing future adaptation and vulnerability. In contributing to the analysis of adaptation, the preceding chapters in this book have addressed a number of barriers or obstacles to the implementation of adaptation measures in response to climate change that affect management and planning. The aim of this book is to go beyond the discussions highlighting vulnerabilities and the need for adaptation, to considering



those challenges or barriers that inhibit the successful implementation of adaptation plans and strategies. Although the approach of the book, which sees a division between political, social, economic, technical, financial and legal barriers to adaptation implementation, allows for detailed consideration of specific identified challenges, the reality is more complex, and these challenges overlap on a number of different levels and issue areas. This final chapter, therefore, sets out to draw together and highlight overlapping challenges and opportunities present in addressing the barriers to adaptation implementation within the Southern African region.

## Development and Adaptation

Climate change impacts and understandings, responses and vulnerability manifest differently in different contexts and across socio-economic spectrums. In addressing barriers to adaptation the first lesson drawn from the analysis is the need to consider a broad understanding of the concept, which, in turn, will have an impact on how adaptation measures will be implemented. This includes demonstrating and highlighting the links between adaptation and socio-economic development. This should ultimately see adaptation measures included in development strategies as well as giving consideration to the inclusion of adaptation issues within development agencies. As pointed out, this could see a co-benefit model and 'no-regrets' approach to simultaneously addressing environmental sustainability and economic development. Not only would this serve to demonstrate the opportunities for development to local communities, but would assist in attracting buy-in at the political level, which would drive support for future initiatives.

Secondly, a narrow understanding of adaptation has had implications for the funding of implementation projects. The challenge has been that funding may not always take into account the implications of a particular project 'downstream'. In other words, consideration needs to be given to the wider externalities of a particular adaptation project in relation to the surrounding natural environment and socio-economic development objectives. Funding may act to confine the focus of an adaptation project, which then restricts engagement on questions concerning unsustainable consumption, production patterns and chains, as well as the use of natural resources. In broadening the focus of adaptation there should be an emphasis on the linkages between systems addressing the links between socio-economic development and the

biophysical environment. The links between adaptation and mitigation are highlighted as a central aspect in determining the future of the climate change regime. Central to the arguments, both within these chapters and in the wider climate change negotiations, is that adaptation and mitigation should receive equal attention and that actions should occur simultaneously. In this regard, strategies need to include a mix of measures to address climate change, including mitigation, adaptation, finance and technological development and research.

## Levels of Engagement

Addressing the levels of engagement is a central element in implementing adaptation measures. On the one hand, the transborder nature of climate change needs concerted international action (mitigation), yet it is the people in the local communities who will be required to adapt to the impacts. As highlighted above, significant importance has been attached to the role of local actors in adopting climate change initiatives. The emphasis has, therefore, been on developing a people-centred approach, as community participation and ownership of adaptation projects will ultimately lead to a willingness to engage in the implementation of adaptation measures. This local focus on community-based adaptation should, however, be linked to national, regional and wider international initiatives. For instance, although local governments may be best placed to understand the local impact of climate change, these needs should be communicated to the higher levels of government to ensure that they are incorporated into decisions taken at a national level.

The role of the region is also singled out in overcoming barriers to adaptation implementation. The Southern African region comprises a number of small economies, including LDCs and small island developing states. Providing a focus on adaptation strategies at a regional level can, therefore, address issues of capacity and resources through the pooling of resources. There has also been a greater focus on the value of regional economic communities in Africa in addressing the proliferation of transnational issues from trade, to migration and increasing challenges to security, including water security in shared river basins, food production, managing of fish stocks and coastal degradation. Regional organisations, such as the Southern African Development Community (SADC), are ideally positioned to be able to support cross-border adaptation initiatives. The value that SADC could contribute by engaging in issues of adaptation could be derived through economies of scale

and by its providing a regional approach to adaptation. Engagement at the regional and continental levels (through the African Union [AU]) may help provide frameworks for greater interaction between the different states. As pointed out, '[o]rganisations at the sub-regional and pan-African level have a crucial role to play owing to the transboundary nature of the adaptation strategies needed to counter climate change. The AU, the New Partnership for Africa's Development (NEPAD) and regional economic communities need to ensure the integration of climate change adaptation into their sectoral programmes'.<sup>6</sup>

At the international level, the UNFCCC has the knowledge to assist countries in mainstreaming adaptation in their national legal frameworks. There is potential for furthering South-South cooperation in bringing adaptation into the wider discussions between developing countries as they look to build their relations across a range of sectors, particularly in socio-economic development. As in the case of regional cooperation, a pooling of capacity and resources, as well as learning from best practices, could provide mutual benefit in addressing the impacts of climate change. Indeed, China has taken a lead in advancing the use of green technology in reducing emissions, which could be of value in guiding and supporting other developing countries looking to move towards a low-emissions development path.

Moving beyond a focus on the state in addressing the different levels of engagement in support of adaptation, the role of local and international NGOs should be acknowledged in supporting and implementing adaptation initiatives. Here there is significant scope for the promotion of networks and synergies, both between NGOs and between NGOs and governments.

## **Importance of Communication, Education and Capacity Building**

A central element present throughout the chapters in this book is the emphasis given to the role of communication, education and capacity building. There is general concern regarding the deficit in knowledge relating to adaptation and its implementation. This is also true in understanding the obstacles to the flow of knowledge that will ultimately shape decisions on adaptation. Therefore, communication and education have important, direct implications for the implementation of adaptation measures.

Effective communication among the different levels highlighted above needs to be pursued. As such, outreach programmes and stakeholder

engagement should be encouraged between government, civil society and business interests. Ensuring effective communication, however, includes key questions in terms of identifying the target audience and how the message should be communicated. How adaptation to climate change is communicated has particular relevance for the success of the implementation of adaptation measures. Today the use of social networks provides a diverse platform in which to raise awareness about a broad section of questions relating to adaptation. However, the technical and scientific debates surrounding climate change are often not understood at a local level, where the impacts of climate change are often felt the most. Information needs to be conveyed in an appropriate format for the target audience so that it is deemed relevant. Those that are involved in education and capacity building concerning adaptation need specific skills in training and an awareness of the obstacles to effective communication.

Often overlooked in discussions concerning adaptation is the value of local knowledge in adapting to the effects of climate change. Local communities may have been adapting to changing environmental conditions over a period of time and have built up local approaches to deal with these challenges. Transposing national, or even international, solutions without taking into account local knowledge may result in maladaptation. Indeed, one of the challenges of adaptation implementation is that different contexts will require different approaches. So although regional and international levels should be included in terms of the support they can provide in knowledge and capacity building, adaptation measures need to be appropriate to particular circumstances on the ground.

A gap in research and development has been identified broadly in Africa. In order to implement adaptation measures effectively and efficiently a sound understanding of the challenges and the means by which to address them (technology) is needed. Technology research and development training programmes can play a central part in supporting capacity building within the region. As the research in this book points out, boosting climate change research capacity will not only support better planning, but also highlight opportunities for sustainable development.

## Leadership and Governance

In overcoming barriers to the implementation of climate change adaptation strong leadership from policy decision makers as well as those outside formal government structures is needed. Suggestions have been put forward that adaptation needs clear ‘champions’ to raise the profile of the

challenges and push for action at all levels. Leadership at the political level is particularly important, as it plays a key role in unlocking some of the potential barriers to adaptation. However, it faces its own challenge in overcoming issues of short-termism, as issues relating to climate change often require tough decisions that may not be ‘vote-winners’.

In addition to leadership, the question of how measures to address climate change impacts will be governed is a stumbling block both internationally and nationally. At all levels, the question of governance raises concerns about representativeness and transparency in the implementation of decisions. At the international level this has been particularly patent in the negotiations around finance and the Green Fund, where developing countries continue to call for transparency, access, significant increases and finance that is additional to official development assistance. The unequal and restrictive access to the institutional structures impacts most negatively on those who need it the most. Here the differences between developed and developing countries need to be addressed, as developed countries continue to prevail in decisions relating to finance, deciding what happens with the money provided. There is also a need to rationalise the ever growing number of funds to eliminate duplications and harmonise the governance of these funds.

In ensuring good governance, there is a need for appropriate institutional frameworks to facilitate adaptation initiatives. This means facilitating the move towards adaptation by streamlining bureaucratic processes (cutting the red tape), reducing transaction costs and developing and strengthening institutional frameworks and organisations that support adaptation initiatives. Attention has been given to the importance of mainstreaming adaptation priorities into policies. Here analysis has noted that adaptation should not form a stand-alone policy, but should be integrated into existing frameworks. In addition, this process should not be a sudden change in policy and regulations, but should occur incrementally to ensure the ‘climate-proofing’ of development. The value of adjusting already existing regulatory tools rather than creating new ones should also be recognised in addressing issues of adaptation.

## Conclusion

As Mitchell and Tanner posit, ‘[c]rucial to reducing vulnerability to climate change is understanding how individuals, groups and natural systems can prepare for and respond to changes in climate’.<sup>7</sup> Yet it is these same individuals, groups and natural systems that can act as barriers

to the implementation of adaptation measures. Although vulnerability assessment is helping address adaptation, there are a number of factors that may challenge the implementation of adaptation to climate change. As pointed out in a study on impacts, adaptation and vulnerability, 'some common adaptations may have social and environmental externalities. Adaptations to heatwaves, for example, have involved increased demand for energy-intensive air-conditioning'.<sup>8</sup>

In addressing potential barriers to and opportunities for the implementation of adaptation in Southern Africa, this book has highlighted the political, social, economic, financial, technological and legal barriers that may inhibit the effective implementation as well as provide opportunities for socio-economic development within the Southern African region. The authors outline a number of policy considerations in overcoming these barriers, and in some cases demonstrate the positive actions that have been taken in addressing these challenges. What is clearly evident is that despite the local nature of adaptation, there are commonalities within the region in terms of the barriers to adaptation implementation and lessons that could be shared (best practice) in supporting regional, and ultimately continental, initiatives addressing adaptation to the impact of climate change. Although there is still a considerable distance to cover in fully understanding adaptation, this contribution aims to add to the debate in overcoming barriers to adaptation implementation. In highlighting those challenges that act to inhibit the implementation of adaptation, the hope is to support initiatives and the ongoing negotiations addressing these challenges for the benefit of a better Africa and better world.

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# Appendix

## Opening address: Barriers to climate change adaptation implementation in SADC workshop

*Stuart Mangold*

*Senior Policy Advisor, Department of Environmental Affairs*

Manhattan Hotel, Pretoria, 4 April 2011

Distinguished guests,  
Ladies and gentlemen,

It is my pleasure to deliver the opening address for today's workshop on *Barriers to climate change adaptation implementation in SADC*.

As we are all very much aware, climate change is part of the global change issue facing humanity and the world today. There is a growing body of empirical evidence that the large-scale global change of human demography, social systems and the interlinking complex economic processes, is having an impact on the world's climatic conditions. The long-term effects of changing global climate regime are yet to be fully understood.

However, increasing frequency of flood events, droughts and severe storm incidences as well as rising sea levels have been documented around the world. Many of these are also showing a trend towards being more severe than recorded in the past for certain regions. The recent floods and cyclone that struck Australia earlier this year are a case in point.

These extreme natural phenomena have wreaked havoc on human settlements, agriculture as well as the economy of those regions. So too has the environment been affected, as well as the availability of natural resources on which we all depend. In short, these events pose massive risks to society and are not showing any signs of going away!

Over the past few decades, there has been a significant decrease in rainfall for most of the Southern African region. During the same period the region has been experiencing a warming trend and temperatures in the region have risen by over 0,5 °C over the last 100 years. Also, the region has experienced a number of severe flooding events. These extreme climatic events have increased the region's vulnerability, as most countries are predominantly dependent on climate-sensitive sectors, such as agriculture, water, infrastructure and transport, energy, urban planning and management, nature-based tourism, biodiversity and ecosystem goods and services, forestry and fisheries, to name a few.

To put this in the context of the socio-economic situation in the region, the Southern African Development Community (SADC) is marked by enormous economic regional imbalances, characterised by relatively small and undiversified economies, pronounced inequalities and poverty. According to the SADC Regional Strategy Paper and Regional Indication Plan report of March 2010, it is one of the poorest regions in the world – nearly 45 per cent of the total population in SADC lives on \$1 a day. The SADC region has the highest HIV prevalence in the world. Research indicates that one-third of the world's total population living with HIV and AIDS is in SADC, with catastrophic economic and social implications in the region. Worth noting also, this region is showing a rapid population growth rate, estimated to be approximately 2,4 per cent per annum, which is contributing to escalating land use conflicts and exerting pressure on the region's natural resources. For example, it is emerging that there is increasing competition between food production, biofuels, urbanisation, biodiversity and ecosystem services in many countries.

Within this context, the extreme climatic events that the sub-region has been experiencing, especially the El Niño-related droughts, are negatively impacting the inhabitants and economies of the Southern Africa sub-region. For instance, El Niño events that occurred between 1965 and 1997 resulted in significant decreases in agricultural production, thereby accentuating the food insecurity situation in the sub-region. Furthermore, the warming of the Pacific Ocean in 1991 and 1992 caused one of the worst droughts the sub-region has ever experienced in the last century (Glantz et al., 1997). These events resulted in crop losses and death of cattle herds that subsequently led to widespread food shortages. Since 2001, consecutive dry spells in some areas of the sub-region also led to food shortages. For example, in 2001 and 2002 six countries, namely Lesotho, Malawi, Mozambique, Swaziland, Zambia

and Zimbabwe, faced a food deficit of about 1,2 million tonnes of cereals and non-food requirements. These were estimated to cost US\$611 million (SADC, 2002). The 2002 and 2003 drought resulted in a food deficit of 3,3 million tonnes, with an estimated 14,4 million people in need of assistance (Kanji et al., 2006).

For small island developing states, like Mauritius, extreme climatic events have resulted in mean sea level rise of 1,2 mm during the past decade. It is expected that sea level rise will lead to saline intrusion, contaminating freshwater coastal aquifers along the coasts. Additionally, much of the prime agricultural land is located on the coastal plains which are threatened by the sea-level rise. It is forecasted that sea level rise will inundate certain low-lying coastal areas, thereby affecting coastal wetlands and mangrove areas, which are important nursery grounds for fish and other marine species (Government of Mauritius, 2009).

Climate variability can cause severe macroeconomic consequences. In this regard, droughts and floods are important factors determining the economic growth of the Southern African countries. For instance, the Gross Domestic Product (GDP) for Zimbabwe dropped by 3 per cent and 11 per cent after the 1983 and 1992 droughts, respectively (Kanji et al., 2006). In South Africa, the 1992 drought was estimated to have reduced the agricultural GDP by about R1,2 billion and caused a 0,4–1,0 per cent loss in economic growth (Glantz et al., 1997). The same drought cost the Zambian government \$300 million, which caused a \$1,7 billion deficit in 1992 and translated into a 39 per cent drop in agricultural output and a 2,8 per cent decline in the country's GDP (Government of Zambia, 1996).

Ladies and gentlemen, this is an attempt to provide you with a picture of the situation which has characterised the SADC region over the past two decades. The central question is, what are we doing about this? How are we as governments, the private sector, civil society, academics and researchers responding to these challenges, particularly with respect to climate change?

At the 12th Session of the African Ministerial Conference on the Environment (AMCEN) held in Johannesburg in June 2008, ministers decided that the continent needs a coordinated and cohesive response to the effects of climate change. They called for Africa to have a coordinated and united front at the climate change negotiations under the UN Framework Convention on Climate Change and for the continent to stay firmly committed to the ongoing development of the African

Common Position on Climate Change. Although the ideal outcome was not reached at Copenhagen in December 2009, Africa generally held its ground at the negotiations and continued to do so at COP16 in Cancún last year.

AMCEN's leadership and guidance to the African group of negotiators and policy makers remains a crucial element in the process. In preparation for COP17 in Durban later this year, AMCEN, in consultation with the African Ministers of Environment, has developed a Climate Roadmap to take forward negotiations on issues of concern on the African continent, from COP16 (Cancún) to COP17 (Durban). This Climate Roadmap (from Cancún to Durban) has been prepared to provide African Environment Ministers with an analysis of the Cancún outcomes; identify the key issues for Africa in the run-up to COP17 in Durban; and to chart key milestones of actions and activities that AMCEN will engage in to support the enhancement of the common African position and the implementation of the comprehensive framework of African climate change programmes.

As part of the COP16 outcomes, the Cancún Adaptation Framework was established. In this regard, the AMCEN roadmap commits to strengthening existing adaptation networks or establishing new ones. This will require financial resources and technical assistance. We need to engage bilateral and multilateral partners to take concrete steps to ensure that Africa has strong regional adaptation centres and networks in place.

Let us turn to the development and implementation of the Comprehensive Framework of African Climate Change Programmes, which has been under development since the 12th Session of AMCEN in June 2008, part two of the AMCEN Decision on Climate Change taken by the ministers at the meeting. The Comprehensive Framework addresses the critical need to integrate existing and future climate change initiatives and programmes underway or planned for the continent in a consolidated manner. The underlying intention is to promote greater coordination and coherence in the implementation and review of climate change initiatives and sustainable development plans in Africa.

The Comprehensive Framework of African Climate Change Programmes is underpinned by five frameworks of sub-regional climate change programmes, corresponding to each of the five sub-regions of Africa, which focus on sub-regional programmes. The SADC Secretariat with the support from the AMCEN Secretariat has been driving the

development of the Framework of Southern African Sub-Regional Climate Change Programmes, and the final draft document has been produced. The framework covers both adaptation and mitigation and includes an inventory of programmes and projects on capacity building, finance and technology transfer to support these two complementary issues, as provided by SADC countries.

The framework of sub-regional climate change programmes for Southern Africa prioritises adaptation, with three broad areas of implementation:

- Disaster reduction and risk management, including early warning, preparedness, emergency response and post-disaster recovery.
- Sectoral planning and implementation: Adaptation in key sectors, including water, agriculture, coastal zones, health, infrastructure, biodiversity and ecosystems, forests, energy, urban management and tourism, taking into account the cross-sectoral implications.
- Building economic and social resilience through the diversification of economies to reduce dependence on climate-sensitive sectors, including the use of indigenous knowledge and practices and the strengthening of community organisations.

The Framework of Sub-Regional Climate Change Programmes for Southern Africa is indeed a major step for us to understand the array of climate change work underway in the region and to assess where the gaps are and where further work is required.

With this in mind, colleagues and delegates, during your deliberations upon the theme for today's workshop of *Barriers to climate change adaptation implementation in SADC*, it is my sincere wish that you do not only concentrate on identifying and defining the 'barriers', but also on coming up with recommendations and proposed solutions as to how climate change adaptation programmes could be more effectively implemented within the SADC region. This should include what capacity is required, financing and what roles the respective institutions involved in climate change could play – and, of course, how do we make their work more effective in order to achieve the desired outcomes? Science, research and technology have been identified as key in mitigating the risks and maximising opportunities for innovation in combating climate change.

In conclusion, developing and implementing appropriate adaptation programmes for the SADC region will be instrumental to the region's effective response to the impacts of climate change. It therefore follows

that emphasis should be placed on determining the appropriate adaptation actions and interventions to address the impacts of climate change on these sectors. A thorough analysis of the context in which these are to be implemented is therefore vital.

Distinguished delegates and colleagues – I wish you very fruitful and lively discussions during today's workshop.

I thank you!

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# Overcoming Barriers to Climate Change Adaptation Implementation in Southern Africa

Adapting to the impacts of climate change is one of the greatest challenges facing the African continent. Although initially couched as primarily an environmental challenge, its importance in the socio-economic development of the region has seen the prioritisation of adaptation in the African common position at the United Nations Framework Convention on Climate Change (UNFCCC) climate change negotiations. This emphasis has resulted in a number of studies on the vulnerability of countries to climate change, including case studies detailing examples of adaptation in practice. Yet the understanding of the implementation of adaptation measures needs further nuance in its approach. This book goes beyond highlighting the importance of adaptation in supporting future socio-economic development, to grappling with the challenges in implementing adaptation measures with the authors addressing some of the key obstacles facing the implementation of adaptation projects. In building an understanding of the barriers, and in unpacking the real implications for those leading adaptation efforts in Southern Africa, this book aims to not only bring to the fore elements that act as a constraint, but to further the discussion on how best to overcome these barriers in adapting to climate change.



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